"IMPACT OF PEER EDUCATION ON SELF CARE IN DIABETES MELLITUS - A RANDOMIZED CONTROL TRIAL IN URBAN FIELD PRACTICE AREA"

REG. NO.BD0110004

Dissertation

Submitted to the
KLE University, Belgaum, Karnataka

In partial fulfillment
of the requirements for the degree of

M. D.
in
COMMUNITY MEDICINE

DEPARTMENT OF COMMUNITY MEDICINE,
JAWAHARLAL NEHRU MEDICAL COLLEGE,
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ENDORSEMENT

This is to certify that the dissertation entitled **"**IMPACT OF PEER EDUCATION ON SELF CARE IN DIABETES MELLITUS - A RANDOMIZED CONTROL TRIL IN URBAN FIELD PRCTICE AREA**"** is a bona fide research work done by **REG. NO. BD0110004**

Dr. S. M. KATTI MD
Professor and Head,
Department of Community Medicine,
J. N. Medical College,
Nehru Nagar, Belgaum – 590 010

Date:29.09.2012
Place: Belgaum

Dr. A. S. GODHI MS
Principal,
J. N. Medical College,
Nehru Nagar,
Belgaum – 590 010

Date:29.09.2012
Place: Belgaum

LIST OF ABBREVIATIONS USED

ACCORD	-	Action to Control of Cardiovascular Risk in Diabetes
ADA	–	American Diabetes Association
ANOVA	–	Analysis of Variance
ADEPS	-	Amrita Diabetes Endocrine Population Survey
CHW	–	Community Health Worker
CPI	–	Consumer Price Index
CUPS	–	Chennai Urban Population Study
CURES	–	Chennai Urban and Rural Epidemiological Survey
DM	–	Diabetes Mellitus
GDP	–	Gross Domestic Product
GP	-	General Practitioner
HbA1c	–	Glycated hemoglobin
ICMR	–	Indian Council of Medical Research
IDF	–	International Diabetes Federation
IEC	–	Information, Education & Communication
JNMC	–	Jawaharlal Nehru Medical College
NCD	–	Non Communicable Diseases
NFHS	-	National Family Health Survey
OBC	-	Other Backward Classes
PHC	–	Primary Health Centre
PODIS	–	Prevalence of Diabetes in India study
SC	–	Scheduled Caste
SES	–	Socio Economic Status
SHG	–	Self Help Group

SMBG	–	Self Monitoring of Blood Glucose
ST	–	Scheduled Tribe
T2DM	-	Type 2 Diabetes Mellitus
UHC	–	Urban Health Centre
UK	–	United Kingdom
USA	–	United States of America
WHO	–	World Health Organization

ABSTRACT

Introduction

Diabetes has reached epidemic proportions worldwide. India will have 80 million diabetics by the year 2030. India has the maximum number of diabetics in the world and rightly declared as the diabetes capital of the world. Health systems throughout the world are looking for more patient centered approaches to make the services more responsive to the patients and the public.

Objectives

Hence the objectives of the present study were to study the impact of peer education among intervention group with self care management strategy in Diabetes Mellitus by peer educators.

Methodology

This is a randomized control trial done in the known cases of Diabetes Mellitus on treatment in the age group of more than 25 years residing in the Khasbag Urban Field Practice Area, under J. N. Medical College, Belgaum. These study participants in the intervention group were subjected to six sessions of peer education by diabetic peer educators over a period of six months. These peer educators were trained earlier on all aspects of Diabetes self care. Institutional Ethical clearance was obtained and written and informed consent was taken from the study participants. The impact was assessed in the intervention group and compared with the control group using pre and post test questionnaire.

Results

The mean test scores in the intervention group before and after the intervention were 11.03 (±2.51) and 20.92 (±2.34), the results showed clearly significant improvement in knowledge and attitude and scores in the intervention group, than in the control group, indicating the potential of the peer education model. The study participants could easily recall and associate symptoms of hypoglycemia, blood glucose levels and importance of diet and exercise in Diabetes; however no immediate behavioural changes were seen in the study participants.

Conclusion

This simple and practical model shows that peer education helps in improving the knowledge about diabetes and thereby bringing about a behavioral change in the patients. This study will also attempt to prove that the simple health education sessions added in the patients' routine can improve their understanding of the disease and aid in the prevention of the further complications; thereby reduce the burden and the health expenditure on the disease.

Key words

Diabetes, Peer education, Self care.

(Word count – 343)

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INTRODUCTION

The global health landscape has been undergoing tremendous change with development around the world as its key factor. [1] Chronic non-communicable diseases (NCDs) have replaced communicable diseases as the most common cause of morbidity and premature mortality worldwide. Around 80% of the burden occurs in the low and middle income countries and 25% in younger population. [2] This is mainly because the developing and middle income countries are undergoing a kind of 'demographic and epidemiological transition'. The population structure, life styles and the diseases affecting these countries has changed. It is estimated by the WHO report 2004 that by 2015 just two diseases- Diabetes and Cardiovascular diseases together will reduce the global GDP by 5%. [2]

Diabetes mellitus has reached epidemic proportions worldwide. According to the World Health Organization (W.H.O.) estimates, India had 32 million diabetic subjects in the year 2000 and this number would increase to 80 million by the year 2030. The International Diabetes Federation (IDF) also reported that the total number of diabetic subjects in India is 41 million in 2006 and that this would rise to 70 million by the year 2025. [2] Studies on migrant Indians have shown that they have a higher predisposition to diabetes and coronary artery disease compared to other ethnic groups. [3, 4] Hence WHO has declared India as the 'Diabetic Capital' of the world. It has also commented that 'this apparent epidemic of diabetes which is strongly related to lifestyle and economic change'. Over the next decade the projected number will exceed 200

million. Most will have type-2 diabetes, and all are at risk of the development of complications.

Health systems throughout the world are searching for ways to make their services more responsive to patients and the public. Often there is a perceived need to respond to "patient" pressure and to make health care more like other consumer experiences. But the need for "patient engagement", in which patients are encouraged to take an active role as key players in protecting their health, coping with acute episodes of ill-health and managing chronic disease, is often ignored. Substantial evidence exists that this not only improves patients' experience and satisfaction, but can also be clinically and economically effective. (1)

Diabetes is both a lifelong and a twenty-four hour a day condition. Glucose control and prevention of complications is almost entirely in the hands of the person who lives with this condition. His / her motivation to eat, exercise, take medication, test glucose levels, and maintain a normal body weight are all part of their life's other motivations. Most people cope with minor illnesses without professional help. Self-care – actions that people take to recognize, treat and manage their own health problems independently of the medical system – is the most prevalent form of health care. Failure to recognize and support people's self-care efforts encourages unnecessary dependency on professionals. The result is increased demand for expensive health care resources, which threatens to undermine the long-term sustainability of many health systems.

For these hundreds of millions of people, the diagnosis of diabetes imposes multiple daily demands on them and their families. Typical self-care activities include adjustment of food intake to meet the daily needs, regular

physical activity, foot care, medication administration (insulin or oral hypoglycaemic agents, medication to prevent complications), home glucose monitoring (blood and/or urine); regular medical monitoring visits, and other health behaviours (for example, dental care, proper clothing); all of which may vary depending on diabetes type.

People have always talked with each other and shared ideas on how to manage their health. This sharing and giving of support has lately come to be called peer education or peer support. People with chronic conditions, for example diabetes, depression, eating disorders, asthma, arthritis and hypertension, have benefited from *lay-led self-management education* in which they learn from other people with the same chronic condition. [(5)] Research to date indicates that peer support is a promising approach for diabetes management. However, there is still much to learn about how best to organize and deliver effective peer support programmes, which types of programmes are best for different types of patients and settings, and how best to integrate peer support interventions into other health services. Self-management education seems to work best when it is integrated into primary and secondary health care systems and the learning is reinforced by professionals. These can be very effective. Diabetes patients have been seen to gain health benefits from self-management education. Moreover, some studies have shown that these can lead to a reduction in health service costs. [(1)]

This study attempts to enhance and promote the health and well being of those affected by diabetes, including their families and community using peer educators. It tries to address the key risk factors that can exacerbate diabetes complications. The study also tries to coordinate community action between

volunteer peers and health professionals; stimulated multi-sectoral action; and integrated diabetes care into the existing community infrastructure.

If proven successful, peer support interventions may help patients with diabetes self-manage more successfully without putting additional strain on the shortage of health workers. Peer support models are especially promising for resource-constrained health systems, as they are much less resource-intensive than interventions requiring concentrated health worker involvement. As such, peer support interventions are a potentially important policy option for low and middle-income countries.

OBJECTIVES

The objectives of the present study were;

- To know the knowledge, attitude and self care practices about Diabetes Mellitus among patients with Diabetes Mellitus.

- To study the impact of peer education among intervention group with self care management strategy in Diabetes Mellitus.

REVIEW OF LITERATURE

Type 2 diabetes is the commonest form of diabetes constituting 90% of the diabetic population in any country. The global prevalence of diabetes is estimated to Increase, from 4% in 1995 to 5.4% by the year 2025. [6] The countries with the largest number of diabetic subjects are, and will be India, China and U.S. and in the former two countries diabetes occurs mostly in the age range of 40-64 yrs, in contrast with an age of > 65 years in the developed countries. Epidemiological studies conducted in India, showed that not only the prevalence was high in urban India but it was also increasing. [5]

Hence Diabetes has emerged as a major health care problem in India. According to the Diabetes Atlas published by the International Diabetes Federation (IDF), there were an estimated 40 million persons with diabetes in India in 2007 and this number is predicted to rise to almost 70 million people by 2025, by which time every fifth diabetic subject in the world would be an Indian. The more disturbing trend is the shift in the age of onset of Diabetes to a younger age. [7, 8, 9]

Diabetes is defined as a metabolic disorder characterized by the presence of hyperglycemia due to defective insulin secretion, insulin action or both. The chronic hyperglycemia is associated significant long term sequels, particularly damage and dysfunction of various organs especially the kidneys, eyes, nerves, heart and blood vessels. [10]

The present classification of diabetes is based on the etiology of diabetes. The classification of diabetes is:-

1. Type 1 Diabetes Mellitus (beta cell destruction leading to absolute Insulin deficiency)
2. Type 2 Diabetes Mellitus (may range from predominantly insulin resistance with relative insulin deficiency to predominantly secretary defect with insulin resistance)
3. Gestational Diabetes Mellitus (onset or recognition of glucose intolerance during pregnancy)
4. Other specific types:-
    - Genetic defects of beta cell function (maturity onset diabetes of the young)
    - Genetic defects in insulin action
    - Type A insulin resistance, Leprechaunism, Rabson Mendon hall Syndrome
    - Diseases of the endocrine pancreas:- Pancreatitis, trauma, Pancreatectomy, Cystic fibrosis, Heamochromatosis, Fibrocalculous Pancreatopathy
    - Endocrinopathies: - Acromegaly, Cushing's syndrome, Pheochromocytoma and Hyperthyroidism.
    - Drug or Chemical induced e.g.: Pentamidine, Nicotinic acid, Glucocorticoids, Diazoxide, Beta adrenergic agonists and Thiazide diuretics.

Diabetes causes severe morbidity. Complications of diabetes can be divided into three categories:

- Metabolic complications of low blood glucose levels (hypoglycaemia) and of high blood glucose levels (hyperglycemia). Diabetic coma is one such metabolic complication of a particularly severe nature;
- Damage to small blood vessels (microvascular complications) leading in turn to damage to the retina (retinopathy) kidney (nephropathy) and nerves (neuropathy);
- Damage to the larger arteries leading to the brain (leading to stroke) or to the heart (leading to coronary heart disease) or to the legs and feet (leading to peripheral vascular disease-macro vascular complications).[(10)]

The burden due to Diabetes and its complications is constantly increasing. According to World Health Organization's Report on **Global Status on NCDs,** the global mortality attributable to diabetes in the year 2010 was estimated to be 2.9 million deaths, equivalent to 5.2% of all deaths. Excess mortality attributable to diabetes accounted for 2–3% of deaths in poorest countries and over 8% in the U.S; Canada, and the Middle East. In people 35–64 years old, 6–27% of deaths were attributable to diabetes. The total number of people with diabetes is projected to rise from 171 million in 2000 to 366 million by 2030. Unfortunately among the estimates in 2000 and 2030, India is ranked first with 31.7 million in 2000 and estimated to rise to 79.4 million by 2030, a huge leap of about 150%. The findings also indicate that the "diabetes epidemic" will continue even if other factors remain constant. Given the increasing prevalence of obesity, it is likely that these figures provide an underestimate of future diabetes prevalence. [(2)]

Evolution of Burden of Diabetes

To do a comparative analysis on the prevalence of diabetes in the first half of 20th century is difficult, as there were no standard criteria for diagnosing diabetes. Most of the earlier studies were based on hospital records and used glycosuria as the diagnostic criteria. Ramaiya et al [(11)] has made an excellent compilation of all earlier studies in their article published in 1991. This study has a compilation of research on the prevalence of diabetes in India from 1938 to 2007. The earliest documented study on prevalence of diabetes in India was done in Calcutta (now Kolkata) in 1938. [(12)] Out of the 96,300 medical records checked, 1% was found to have diabetes diagnosed by glycosuria. Another hospital based study from Mumbai [(13)] reported a prevalence of 0.7% in 1959. The first study done in South India was at Vellore in 1964. [(14)] This hospital based study done on 63,356 individuals showed a prevalence of 2.5%. In 1966, house to house surveys did in Chandigarh, Puducherry and Varanasi reported prevalence rates of 2.9%, 0.7% and 2.7% respectively. [(15, 16, 17)] In the same year, a study based on hospital records In Thiruvananthapuram reported a high prevalence of 8.7 %. [(18)]

Although sporadic studies on prevalence of diabetes have been available for several decades, reliable epidemiological data became available in India only since the 1970's, published studies vary in methodologies adopted and sampling frames and hence comparison of prevalence rates is, strictly speaking, not meaningful. However these studies show that, despite all methodological issues, there is little doubt that the prevalence rates are rising in India. The Indian Council of Medical Research (ICMR) study done in the 1970's reported a

prevalence of 2.3% in urban areas, [19, 20] which has risen to 12-19 % in 2000's. Correspondingly, in rural areas, prevalence rates have increased from around 1% [19, 20] to 4-10%, and even 13.2% in one study. [21] Thus it is clear that both in urban and rural India, prevalence rates of diabetes are rising rapidly with a rough urban-rural divide of 2:1 or 3:1 being maintained through the last 2-3 decades. [3]

Beginning of the rise in the prevalence of diabetes in India in the '80s

The early signs of the looming diabetes epidemic were seen in the Tenali study of 1984 which reported a high prevalence of 4.7% in a small town in Andhra Pradesh. [22] A prevalence of 3.8% was reported in 1986 from Bhadlan, a rural area in Haryana which was relatively higher compared to earlier surveys done in different cities in the previous decade. [23]A study done in Kudremukh, in 1988 a township in Karnataka revealed a prevalence of 5.0%. [24] The Daryaganj diabetes survey done in the year 1986 in an affluent neighbourhood of Delhi showed a prevalence of 3.1% of known diabetes. [25] In the same year, a survey in Rewa, rural Madhya Pradesh in 1988 showed a prevalence of 1.9 %. [26] The prevalence of known diabetes in Eluru survey done in 1989 in rural Andhra Pradesh was 1.5%. [27] However, in individuals aged above 40 years, the prevalence of known diabetes was 6.1%, which was unexpectedly higher for a rural area. [27]

A multicentre study was carried out in different regions of India in 1991 by Ahuja et al. [28] in rural areas from different parts of the country near Ahmadabad, Calcutta, Delhi and Trivandrum reported prevalence rates of 3.9%, 0.8%, 1.5% and 1.3% respectively. The remote high altitude area of Himachal

Pradesh, Kalpa had a prevalence of 0.4%. The same study revealed that the prevalence of type 2 diabetes was 4.1% in an industrial neighbourhood of Delhi. In 1994, Wander et al [29] in 1994 reported 5% prevalence of diabetes (criteria: random venous blood glucose >180mg/dl or history) among a rural population in Ludhiana, Punjab. Another study from North Arcot district in Tamil Nadu reported a prevalence of 4.9% in a rural area. [30]

From these data, it appears that there is a rising pattern in the prevalence of type 2 diabetes in India both in the urban as well as the rural areas.

Rapid rise in the prevalence of type 2 diabetes in India (1990's to 2007)

Further evidence for the rise in prevalence of type 2 diabetes came from Chennai, as the prevalence of type 2 diabetes had risen to 11.6% (1997) in the same urban area which had a prevalence of 8.2% (1992) five years earlier. [31, 32] In 1998, a study from Guwahati reported a prevalence of 8.2 %. [33]A study done in Kerala showed a very high prevalence of 16.3% in 1999. [34] The Kashmir valley study done in 2000 recorded a prevalence of 6.3%. [35] The prevalence of 'known' diabetes was 1.9% whereas the prevalence of 'undiagnosed' diabetes was 4.3%, which was more than double that of diagnosed cases. [35] The National Urban Diabetes Survey (NUDS) was a population based study conducted in six large cities in 2001 from different regions of India. This study was done on 11,216 subjects aged over 20 years from all socio-economic strata. [36] The WHO criterion was used for diagnosis diabetes after an Oral Glucose Tolerance test using capillary blood. The study showed that the age standardized prevalence of type 2 diabetes was 12.1%. The prevalence was the highest in Hyderabad

(16.6%), followed by Chennai (13.5%), Bengaluru (12.4%), Kolkata (11.7%), New Delhi (11.6%) and Mumbai (9.3%). [36]

Gupta et al reported a prevalence of 16.8% from Jaipur in 2003. [72] The Prevalence of Diabetes in India Study (PODIS) done in 2004 in 108 centres of India reported a prevalence of 5.9% in the urban and 2.7% in rural areas according to the WHO criteria. [37] According to the ADA criteria, the prevalence rates were 4.6% and 1.9% in urban and rural areas respectively. [11] A house to house survey done in 2004 in a rural area near Mysore reported a prevalence of 3.8 %. [38] The Chennai Urban Rural Epidemiology Study (CURES) showed a prevalence of 15.5% (age standardised 14.3%) in Chennai in 2006. [39] The Amrita Diabetes and Endocrine Population Survey (ADEPS), a community based cross-sectional survey done in 2006 in urban areas of Ernakulum district in Kerala has revealed a very high prevalence of 19.5%. [40] The ADEPS has reported the highest prevalence of diabetes in a population in India. A recent study from rural Maharashtra in 2006 showed a high prevalence of 9.3%. [41] A very high prevalence of 13.2% was also reported in a rural population of Andhra Pradesh by Chow et al in 2006. [21]A multicentre study on industrial populations in 2004 in different parts of India reported a prevalence of 10.1%. The prevalence of self reported diabetes was 5.6% in this study population. [42]

Urban Rural differences in the prevalence of diabetes

Urban rural differences in the prevalence of diabetes have been consistently reported in India. While the ICMR study in 1978 reported that the prevalence was 3.0% in urban and 1.3% in rural areas, [20] a later study in 1992 showed that the

prevalence was three times higher among the urban (8.2%) compared to the rural population (2.4%). [36]

A study done in Moradabad, U.P; in 1998 reported a prevalence of 6.0% in urban area and 2.8% in rural area. [43] A study done in southern Kerala looked at the prevalence of type 2 diabetes; the prevalence of diabetes was the highest in the urban (12.4%) areas. [4]

The Prevalence of Diabetes in India Study (PODIS) was carried out in 2004 in 108 centres (49 urban and 59 rural) in different parts of India to look at the urban- rural differences in type 2 diabetes and glucose intolerance. Diabetes was defined according to WHO and ADA criteria. According to ADA criteria, the prevalence of diabetes was 4.7% in the urban and 1.9% in the rural areas. The prevalence of diabetes according to WHO criteria was 5.6% and 2.7% among urban and rural areas respectively. [8, 37]

However, two recent studies, from rural areas of Maharashtra in 2006 [73] and Andhra Pradesh in 2007 have reported very high prevalence rates which are almost equal to those reported in urban India. [21]

Lowering of age at onset of type 2 diabetes

It has been documented that Indians have a younger age of onset of diabetes compared to other ethnic groups. [45] An increase in the prevalence of type 2 diabetes in the younger age group has been noted from the epidemiological studies. The Daryaganj survey done in Delhi in 1986 reported that none of the diabetics were aged less than 30 years. [25] However, the NUDS done in 2001 showed that the prevalence of diabetes in those aged below 30 was 5.4%. [36] The

CURES investigators in Chennai in 2006 demonstrated a temporal shift in the age at diagnosis to a younger group when compared to the NUDS study published just five years earlier. [36, 39] A study from Delhi in 2004 also reported a high prevalence of insulin resistance in children which was associated with excess body fat and adiposity. [46] Hence it is increasingly becoming clear that type 2 diabetes has become prevalent even among younger age groups. This disturbing fact could have long lasting effects on the health of the nation and its economy.

Gender differences in the prevalence of diabetes

Some of the population based studies have reported that the prevalence was higher in women. [36, 34] Majority of the population based studies multicentric studies like NUDS and PODIS reported similar prevalence of diabetes in males and females. [8, 37, 36] However, a recent study from Manipur in 2001 reported a higher prevalence in males than in females. [47]

Impact of socio-economic status

Diabetes has been generally considered a disease of the rich and affluent. The CUPS was done in 2003 to assess the effect of socio-economic status on the prevalence of type 2 diabetes and related abnormalities. [48] The study involved two residential areas in Chennai representing the lower and middle income group. The overall prevalence of diabetes was 12% in the population aged above 20 years. The age standardised prevalence was 12.4% in the middle income group compared to 6.4% in the lower income group. [48] The prevalence of related

metabolic abnormalities like obesity and cardiovascular risk factors were also markedly higher in the middle income group.

Another study from New Delhi done in 2001 showed that even the slum dwellers had high prevalence of obesity, glucose intolerance and dyslipidemia. [49] This suggests that diabetes is no longer a disease of the affluent or a rich man's disease. It is becoming a problem even among the middle income and poorer sections of the society. Studies have shown that the poor diabetic subjects are more prone to complications, as they have little access to quality health care. [50] This presents an alarming picture as the poor would find it more difficult to cope with the diabetes epidemic.

What needs to be done?

With an estimated 40 million people suffering from the condition, the largest in any country in the world, diabetes has become a major health care problem in India. Recent epidemiological studies from India point to the great burden due to diabetes and its micro and macro vascular complications. This is primarily because the status of diabetes control in India is far from ideal. Based on the available data, the mean glycated haemoglobin levels are around 9% which is at least 2% higher than the goal currently suggested by international bodies. The IMPROVE study conducted in eight metropolitan cities across India in 2008 has helped identify the barriers to good control of diabetes both among patients as well as physicians in today's practice. However the recent Action to Control of Cardiovascular Risk in Diabetes (ACCORD) study conducted in U.S.A. and Canada points to the dangers of overaggressive treatment, especially

in high risk in elderly patients. A balanced approach to improve awareness about diabetes and its control both among patients and the medical fraternity is urgent need of the hour in India. The associated risks of tight control in high risk groups should also be kept in mind. (51)

Diabetes educators say that 90% of diabetes care is self-care. Physical movement, healthy eating, self-monitoring and relaxation are far more important than anything the medical profession can do for diabetes (or for most other chronic conditions). But self-care has a social context, and in this society, that context is mostly negative. Self-care is not something people see on TV or learn in school. People have to inculcate the qualities from within. They may have a few role models for it. (52)

Individuals, families and communities can play distinct roles in promoting health in the following ways:

- by understanding the causes of disease and the factors that influence health;
- by self-diagnosing and treating minor self-limiting conditions;
- by selecting the most appropriate form of treatment for acute conditions in partnership with health professionals;
- by monitoring symptoms and treatment effects;
- by being aware of safety issues and reporting them;
- by learning to manage the symptoms of chronic disease;
- by adopting healthy behaviours to prevent occurrence or recurrence of disease; and

- by critiquing and feeding back on the quality and appropriateness of health care services.

People Centered Approach

People with chronic conditions, like diabetes, have benefited from *self-management education* in which they learn from other people with the same chronic condition. Global community members who experience similar health problems gravitate to each other for information and support. Peers may be more approachable and can relate to the particular living circumstances one experiences. In well-resourced countries, people have opportunities for learning diabetes self-management; however, empathy may be more helpful when practical barriers arise. Little is published in medical literature about how to foster diabetes peer support and what is published is often limited to English language. Among those programs available, commonalities are readily seen. There is significant evidence that well-informed people cope better with adapting their lifestyle to medical regimens. Professionally delivered diabetes education has been well defined, but there may be additional benefit from learning from those who are living the experience everyday regarding how to navigate health care systems, handle finances, deal with natural emotions or family relations. Diabetes is epidemic and worldwide. There will never be sufficient traditional health care services to meet all future patients' needs. While we persist in training health care professionals to deliver better diabetes care, we can explore how to mobilize willing volunteers to provide additional ongoing support to people with diabetes, where they live and work. While the characteristics of a peer educator

have been defined slightly differently by several programs, there is agreement across programs that they need to be able to communicate clearly, they need to be willing to learn, they need to have confidence and they need to be flexible and dependable.[9]

In 1998, the National Community Health Advisor Study conducted by the University of Arizona and the Annie E. Casey Foundation [53] identified seven core services that could be provided by a CHW or peer educator. The seven services were as follows:

- Bridging cultural mediation between communities and the health care system.
- Providing culturally appropriate and accessible health education and information.
- Assuring that people get the services they need.
- Providing informal counseling and social support.
- Advocating for individuals and communities within the health and social service system.
- Providing direct services such as basic first aid and administering health screening tests.
- Building individual and community capacity. [6]

In the study Peer Advisors, Isle of Wight in 2005 there were two levels of Peer Advisors in this program. The first level of training takes place over 18 weeks (90 minutes/week) after which there was a written and an oral examination. If successful the Peer Advisors would be expected to provide one-

on-one support for others with diabetes, be effective committee members and function as trainers for other advisors. Each Peer Advisor was assigned a health professional mentor and worked closely with the mentor (i.e. rehearsals) before setting out to give a lecture. This part of the curriculum was not available. In order for these Peer Advisors to help people with self-management strategies, there was an additional 6 session training course. This part of the curriculum was available and is very specific to diabetes management at a high level of complexity. In the words of the author, Baksi (2006) ‘‘Peer Advisors would then be as effective as specialist health professionals in this field of delivering training for people with diabetes.’’ Peer advisors were monitored carefully—all consultations were recorded and reviewed by the monitor before a copy was sent to the general practitioner. [(9)]

The Project Hope—Mexico, C. Guthereau August 2, 2007 - The ‘‘5 Steps to Self-Care Program’’ was originally designed to be taught by health care professionals, while in the five Steps program participants were expected to be role models and to do ‘‘homework assignments’’ with family and friends. This was part of the grassroots strategy to raise awareness about diabetes within the family and the community at large. Graduates of the five Steps program were later asked to be able to run it themselves. As well as completing the five Steps program potential Peer Educators completed a 50 hour ‘‘Lend a Hand’’ program and 24 hours supervising trainees in the five Steps program. Pre and post written testing was done, and it was reported that the peers had done as well as the healthcare professionals in the post test. Health care professionals observe

trainees hosting the five Step program and feedback were given on a 10 point scale. Patients also rate the trainees. [9]

Lay educators were trained by the Diabetes Association of Jamaica. L. Less (2007) to conduct education programs throughout the island. Peer educators were selected based on attainment of secondary level education and being a member of the community. Training consisted of 4 hours of basic diabetes information taught by a physician, chiropodist, nutritionist and a lay diabetes educator. Pre and post testing was done, those attaining more than 90% received a certificate from the Diabetes Association and the Ministry of Health as a Lay Diabetes Facilitator.[9]

The Stanford Self-Management Programme was primarily for self-management of any chronic disease, not specifically diabetes. However additional diabetes specific training has been added and several diabetes self-management programs have been completed and outcomes published. Training for Master trainers is 4½ days with the option of 1 extra day on positive Self-Management. Master Trainers train the Leaders of the Self-Management Programs. Leaders or Peer educators received 28 hours of training. A course manual gives the educators the course content and process for all activities they will do in the program for patients. As part of the training they discussed how to handle difficult classroom situations and practice teaching different aspects of the course. Disease specific training was available as an add-on to the basic course. This is one of the oldest and most well regarded peer programs. The claim is made in the Leader's manual that participants in their training will be able to:

- Conduct the Chronic Disease Self-Management (CDSM) Workshop with one other and a trained co leader.
- Utilize the Chronic Disease Self Management (CDSM) Workshop Leader's Manual and accompanying book, 'Living a Healthy Life with Chronic Conditions'.
- Understand the concept of self-efficacy and the strategies to enhance self-efficacy.
- Use the four efficacy-enhancing strategies with their groups: skills mastery through making an action plan, sharing and feedback, modeling, reinterpretation of symptoms and persuasion.
- Utilize the following training techniques: lecture with discussion, brainstorming, demonstration, practice, feedback, problem-solving and making action plans.
- Handle problems that arise in the group learning situation.
- Ask for and use assistance as needed.
- Provide constructive feedback about both the content and process of the workshop to the program coordinator in your facility or area.
- Utilize other course leaders as resource people and/or for assistance as necessary and appropriate.
- Understand and maintain the evaluation requirements of the workshop as determined by your agency or organization. [54]

Robert Wood Johnson Foundation Diabetes Initiatives in one of their programs developed as a part of the Robert Wood Johnson Foundation Initiatives

in 2006 was at La Clinica de La Raza, a community health centre with 23 sites in California, USA. Community Health Workers (CHWs) who were La Clinica patients were recruited based on having diabetes or having a family member with diabetes, possessing good interpersonal skills, and a willingness to help their community. The program consisted of 10 sessions of general training on group facilitation, decision making, popular education methods, making presentations, communication, and analysis, followed by 30 hours of training in diabetes management and the Transtheoretical Model of Change. Ongoing training consisted of biweekly meetings provided instruction and support on topics requested by the CHWs including 12 hours on depression. [55]

Impact of Peer Education

Anne K, David R et. al. in their study in Manchester, U.K (2007); [56] "The effectiveness and cost effectiveness of a national lay-led self care support programme for patients with long-term conditions: a pragmatic randomised controlled trial" tried to show that supporting patients' self care could have a major effect on the management of long-term conditions, which has led to worldwide interest in effective self care interventions. In England, self care support is being developed through the ''Expert Patients Programme'', which provides lay-led generic courses to improve patients' self care skills.

The study was a two-arm pragmatic randomised controlled trial design with waiting list control in community settings in England. 629 patients with a wide range of self-defined long-term conditions were studied. The lay-led self care support group involved 6-weekly sessions to teach self care skills. Primary

outcomes were self-efficacy, reported energy and routine health services utilisation at 6 months. A cost-effectiveness analysis was also conducted.

The results showed that the patients receiving immediate course access reported considerably greater self-efficacy and energy at 6-month follow-up, but reported no statistically significant reductions in routine health services utilisation over the same time period. The cost-effectiveness analysis showed that patients receiving immediate course access reported considerably greater health related quality of life and a small reduction in costs. If a quality adjusted life year was valued at £20 000, there was a 70% probability that the intervention was cost effective. [(56)]

Thus Lay-led self care support groups are effective in improving self-efficacy and energy levels among patients with long-term conditions, and are likely to be cost effective over six months at conventional values of a decision-maker's willingness to pay. They may be a useful addition to current services in the management of long-term conditions.

In her background paper for WHO entitled "Different Models to Mobilize Peer Support to Improve Chronic Disease Self-Management and Clinical Outcomes: Evidence, Logistics, Evaluation Considerations, and Needs for Future Research"(2007), Michele Heisler noted that interventions that mobilize and build on peer support are an especially promising way to improve self management support for patients with diabetes. The most effective models appear to combine peer support with a more structured programme of education and assistance. To date, most efforts to increase self-management and peer support among patients have focused on clinic-based group visits, peer-led training

sessions, and support groups. Peer-to-peer and clinician-led group visits and training sessions improve outcomes for participating patients with diabetes and other chronic diseases. Yet, many patients face difficulties attending regular face-to-face meetings. In even the most successful trials of face-to-face group visits and self-management training sessions, many participants do not attend the sessions. Thus, it is useful to examine the range of different models for effectively mobilizing peer support in conjunction with health-care provider support to improve diabetes outcomes. (57)

Martha Funnel's background paper for WHO entitled "Peer-Based Behavioural Strategies to Improve Chronic Disease Self-Management and Clinical Outcomes: Evidence, Logistics, Evaluation Considerations, and Needs for Future Research" (2007), points out that the diagnosis of diabetes generally evokes strong emotions and often brings with it the need to make changes in lifestyle behaviours, such as diet, exercise, medication management and monitoring of clinical and metabolic parameters. The diagnosis affects not only the person diagnosed, but also family members. While the responsibility for outcomes, such as metabolic control and chronic complications, are shared with the health-care team, the daily decisions and behaviours adopted by patients clearly have a strong influence on their future health and well-being. (57)

In his background paper for WHO entitled "Cross-cultural and international adaptation of peer support for diabetes management,"(2007), Edwin Fisher concluded that peer support holds promise of making substantial contributions to improved self-management among the millions of people with diabetes around the world. A major challenge to international promotion of peer support is

allowing for tailoring to population, cultural, health system and other features of specific settings, while at the same time ensuring congruence with standards for what peer support entails. One strategy to address this challenge was used in the Robert Wood Johnson Foundation Diabetes Initiative in which key functions of self-management – Resources and Supports for Self Management – were identified as explained before. [57]

In the study "Feasibility of diabetes peer education for Turkish type 2 diabetes patients in Dutch general practice." Uitewaal P, Bruijnzeels M et. al. showed in 2004 the feasibility of a 9-months educational diabetes programme was assessed in terms of dropout rate, patient and General Practitioner satisfaction, and GP's perceived workload. Of the 54 Turkish patients (39% males) that signed informed consent, 45 actually started the education. Dropout rate during the programme was 41% (main reason was going abroad for a long period (18%). The individual education sessions and the consultations with the GP were highly appreciated by 87% of the patients and the group sessions by 66%. Although all nine interviewed GPs experienced a higher workload, overall appreciation of the programme was high in six GPs. Although implementation of an ethic-specific diabetes programme in general practice is well appreciated by both patients and GPs, the high dropout rate indicates that the programme needs to be more finely tuned to the individual patient. [42]

Another unique study "Teen peer educators and diabetes knowledge of low-income fifth grade students" by Coleman KJ, Clark AY et. al conducted in Southern California, USA in 2011 was designed to evaluate an adolescent peer type 2 diabetes mellitus (Type 2 DM) prevention training program for fifth grade

children. Peer educators were 22 high school students who participated in the 'Elementary Institute of Science's Commission on Science that Matters', a year-long program promoting active participation in the health and environmental sciences. Peer education was delivered in the form of a two hour health fair. A knowledge survey was given to fifth grade students in the classroom before the health fair began and then again in the classroom after the health fair. Fifth grade students were able to correctly identify Type 1 DM (23 vs. 40%; $P < .01$), Type 2 DM (21 vs. 52%; $P < .001$), and the signs of diabetes (10 vs. 39%; $P < .001$) after the health fair. This approach could be inexpensively integrated into any community-based health promotion with children and adolescents. [58]

The characteristics of the peer educator have been defined differently by several programmes but there is agreement across programmes that they need to be able to communicate clearly, they need to be willing to learn, they need to have confidence and they need to be flexible and dependable. The programmes reviewed above describe slightly different roles for the peer educator, but all comment on the role as a link to the health care professionals. Most programmes see the peer educator as an adjunct to the health professional, not as a replacement. Some of the activities suggested by the various programmes are as follows:

- Teaching problem-solving skills
- Teaching communication skills
- Teaching decision-making skills
- Finding health care resources
- Developing a plan for the future

- Understanding the management principles of diabetes, healthy eating and activity and medications
- Understanding and managing the psychological response to diabetes.

All programmes using peer educators provide some training to the educators. The education provided varies hugely from many weeks, mentoring and oral examination to 4 hours and observation by professionals in the community. Interestingly, while many programmes have been reported in the literature, few provide details on how they trained the peer educators. In some cases, programmes simply did not say how the peer educators were trained; in others, the curriculum was available only to those registered in the course.

METHODOLOGY

The present study was conducted in the urban field practice area of Urban Health Centre (UHC) Khasbag, Belgaum. Khasbag is primarily known for its textile industries and power loom industries. Majority of the population is involved in saree making industry, both on domestic and large scale. It is also known for its Ayurvedic system of Medicine, Ayurvedic treatments and Drug Productions and is widely accepted by the people.

Urban Health Centre, Khasbag, Belgaum is situated at old Pune-Bangalore Road and is 6 Kms from Jawaharlal Nehru Medical College, Belgaum towards south. It has about 1,250 households with 7,689 people (Figure 1). The Urban Health Centre is adequately staffed with Medical Officer, Staff Nurse, separate Pharmacy and an independent Laboratory. The daily out-patient strength is 50-60.

Urban Health Centre Khasbag is the urban field practice area and training centre attached to the Dept. of Community Medicine, J.N. Medical College, Belgaum. It is utilized as the urban training centre for the Interns and as a field practice area for both undergraduate and postgraduate students. Specialty Clinics are held on separate days every week. Prevalence of Diabetes was found to be as high as 12% of population in the area, in view of this, a Special Diabetes Clinic is arranged every Friday and a Diabetes Register is maintained at the UHC for the follow up of these patients. Patients are seen on an out-patient basis, counseling is done and medicines are prescribed and referral is advised as needed. Patients needing special Investigations or Hospital care are referred to J.N. Medical

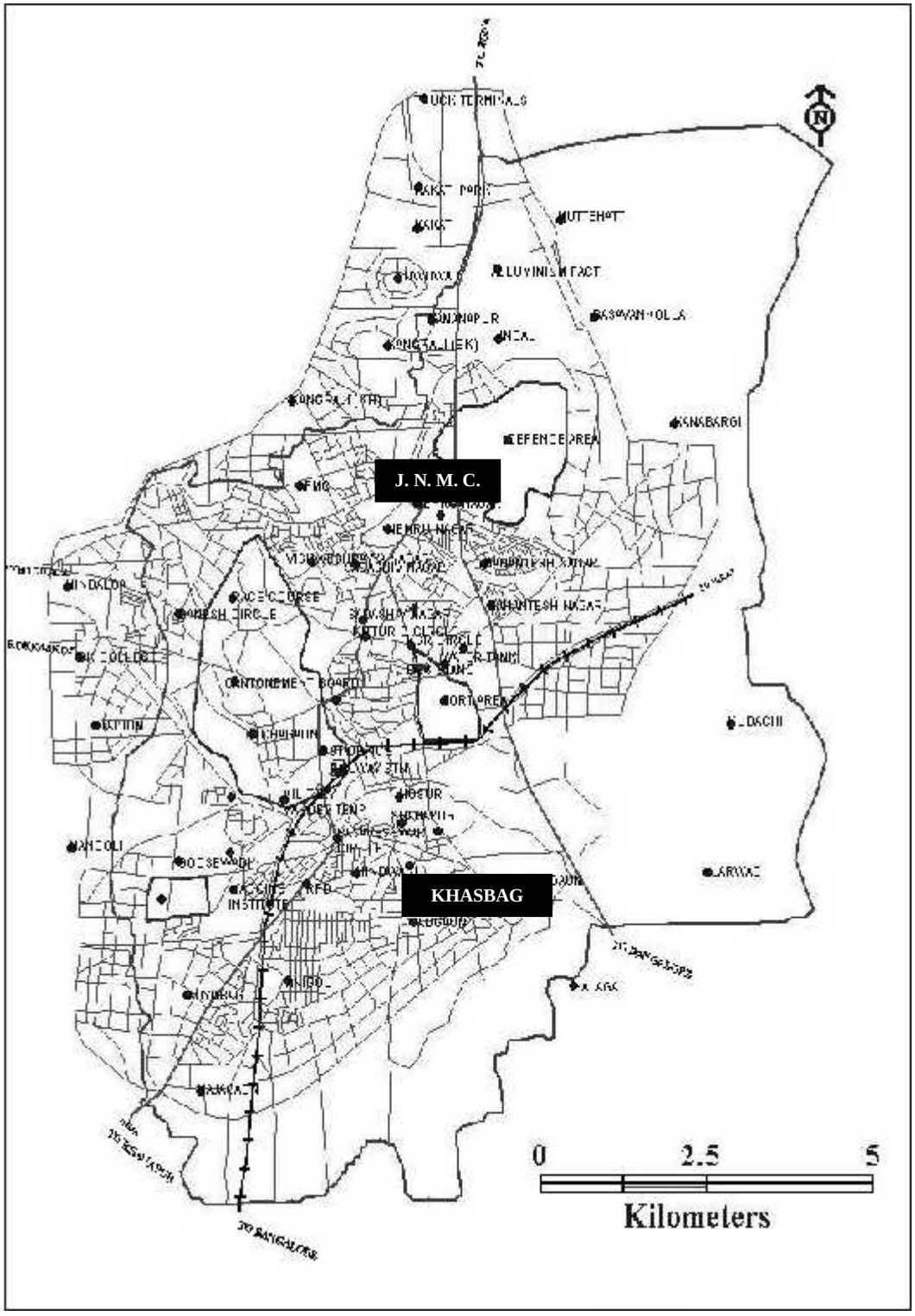


Figure 1. Map of Urban Field Practice Area, Khasbag, Belgaum

College and Dr. Prabhakar Kore Charitable Hospital, Belgaum.

Design

The study design was community based randomized control trial.

Duration

This one year study was conducted from January 2011 to December 2011.

Participants

Known cases of Type 2 Diabetes Mellitus on treatment in the age group of 25 to 60 years residing in the Khasbag Urban Field Practice Area, under J. N. Medical College, Belgaum.

Sample size

The study was powered to detect 20% [59, 60] Standard Deviation change in self-care Practices. The prevalence of self-care practices among the diabetics was found to be 14% by a pilot study, with $\alpha = 0.5$ and power of 90 and with a dropout rate of 10% the following formula was used to calculate sample size (N).

$N = 2(Z\alpha + Z\beta)^2 P (1-P)/(P1-P2)^2$

$P1 = 14$

$P2 = 34$

$Z\alpha = 1.96$

$Z\beta = 1.28$

$P = (P1+P2)/2 = 48/2 = 24$

$N = 2 (1.96 + 1.28)^2 24 X 76/(20)^2$

$= 96.02$

Considering 10% drop out the sample size of study = 107, which was rounded off to 110 per group.

Intervention group - 110

Control group - 110

Total sample size - 220

Sampling procedure

Cluster Sampling technique will be used to allot cluster of patients into intervention and control groups.

Selection of clusters

Since the study is being conducted in a densely populated urban community, randomization at the individual level could result in the subjects randomly assigned to different intervention groups living next door leading to contamination in the study. Hence to overcome this problem, cluster randomization was followed. All the known diabetics living in Khasbag urban field practice area were listed in a sampling frame by conducting a baseline study. These known diabetics in the community were then divided into clusters. Each cluster was defined according to geographical location (i.e. the two wards each with six lanes in urban field practice area of Khasbag). The study subjects were then selected among the residents within the clusters with similar socio-economic

status, education and income level. So that each cluster had diabetics with similar age, education and socio-economic status and they were geographically isolated from each other. These clusters were then be randomly allocated into intervention and control groups. This increased the homogeneity among the groups and decreased the variance in the data.

Selection criteria

Inclusion

- Known cases of Type-2 Diabetes Mellitus above 25 years of age.

Exclusion

- Patients with severe complications of Diabetes (E.g. - diabetic nephropathy, amputations, people with other conditions like stroke /myocardial infarction) etc.

Ethical Clearance

Ethical clearance has been obtained from Institutional Ethics Committee for Human Subjects' Research of J. N. Medical College, Belgaum. (Refer Annexure I: Letter no-MDC/PG/2241 dated 08-10-2010).

Informed consent

The study participants were interviewed in their households by the investigator. The objectives of the study were explained to study subjects. Based on the selection criteria, the study participants were selected and written informed consent (Annexure II) was obtained from all the participants.

Procedure

Before starting the study, baseline study was carried out in the study population by house to house visits to all the households to define the population and to know all the diabetics and the extent of self care practices in the community.

Preparation of the study questionnaire: -

A preliminary questionnaire was prepared after group discussion with these Diabetics, which helped to explore the knowledge and attitude towards self care in Diabetes as well as those of relevant studies. The questionnaire consisted of two sections – socio-demographic details and questions to assess the knowledge of Diabetes, attitude and self-care behaviour and complications. This questionnaire was pre-tested and modified twice before being finalized.

The final questionnaire included 30 questions. The questions were designed to be short and clear and to contain only one idea in each statement. The questions included aspects about the knowledge about diabetes (15), the attitude of the patients towards their disease (10) and the self care practices (5) followed by the patients. Correct answers were scored one point, while incorrect answers were scored as zero.

The questionnaire was administered by the investigator during a house-to-house visit and the information was obtained by personal interview with the respondent. Approximate date for the educational intervention and willingness to act as a peer was discussed with the patient at the end of the interview.

Analysis of the pre-evaluation data identified areas and lacunae in knowledge and skill for the proposed self care intervention. This was further divided into core and support areas and an appropriate curriculum developed and a lesson plan was prepared. The educational intervention tools consisted of a flip chart and a handout, which were both in the local languages – Kannada and Marathi. These were both field-tested before being used in the intervention. (Annexure III)

Scheduling of the teaching-learning sessions was arrived at by mutual consultation with the diabetic patients and the peer educator and was conducted every Sunday afternoon.

Selection of the peers:-

In order for the programme to be more effective the peer educator selected was one of the known cases of Diabetes, since he/she will be in similar situation and will be facing same challenges, his/her acceptance as a group leader will be easier. Moreover he/she will act as a role model for the others. The peer educators were selected based on their ability to communicate clearly, willingness to learn, need to have confidence and should be flexible and dependable and with at least secondary level education. Moreover they will be at an advantage, since they live in the communities in which they work, understand what is meaningful to those communities, communicate in the language of the people and recognize and incorporate cultural buffers (e.g. cultural identity, spiritual coping, and traditional health practices) to help community members cope with stress and promote health outcomes. They were trained about problem-solving skills, communication skills, decision making skills and utilization of health care resources, developing

a plan for the future, understanding the management principles of diabetes, healthy eating, and physical activity, medications, understanding and managing the psychological response to diabetes.

Educating the peer:-

The selected peer educators received optimal diabetes self care training based on **W.H.O. –** Training Manual for Cluster representatives and Health volunteers – Module 4 - Non-communicable diseases, and **International Diabetes Federation (I.D.F.)–** Standards of Diabetes Education, I.D.F. Curriculum for Diabetes Health Education and Overview of Training Curricula for Diabetes Peer Educators [for] 3 hours each day for 4 days. [(7, 61, 9, 10, 3, 54)]

Educating the intervention group:-

The intervention groups were then subsequently trained by a peer educator. Each peer educator led a group of 10-12 people. This group met once a week in Urban Health Centre, Khasbag for one hour session over six consecutive weeks. The peer educators gave education to the intervention groups about diabetes treatment principles, communication with the doctor, utilization of health care resources, and self care practices like healthy eating, importance of exercise, foot care, medications and coping with the psychological response to diabetes. Flip charts, lectures and audio-visual aids were used during the training sessions.

- **Session 1:** Course overview; diabetes overview; cognitive symptom management; introduction to action plans

- **Session 2:** Feedback about previous sessions; dealing with negative symptoms (anger, fear and frustration); Yoga and Meditation introduction to exercise; making an action plan

- **Session 3:** Feedback about previous sessions; distraction; muscle relaxation; fatigue management; better breathing exercise; monitoring exercise; making an action plan

- **Session 4:** Feedback about previous sessions /making an action plan about healthy eating; communication skills (with family, friends and health care providers); problem solving

- **Session 5**: Feedback about previous sessions /making an action plan about medication usage; depression management; self-talk; treatment decisions

- **Session 6:** Feedback about previous sessions; informing the healthcare team; working with your health care professional; looking forward to good health.

Each session was independently monitored by the investigator. The flaws and the challenges were identified in each session and subsequently modified for the next session. (Annexure III). The study participants were also given Identity cards to keep record of their sessions.

Random Blood sugars

Random blood sugars of the study participants were also recorded to compare the impact of the study intervention on the participants in the intervention and the control groups.

Reinforcement of training:-

A refreshers' course was provided (after the end of the six training sessions) every month to the intervention groups by the peer educators and the post-test evaluation was done using the same questionnaire at the end of six months to know the improvement in the knowledge, attitude and self care practices in diabetes.

Control Groups:-

The control group did not receive any health education about diabetes; however at the end of the study after post test evaluation, the control groups was also educated about self care in Diabetes Mellitus - lecture discussion and distribution of handouts in Kannada and Marathi by the investigator at urban health centre, Khasbag. (Annexure III)

Hypothesis

Evidence from the similar studies reveals that peer education has a positive impact on the knowledge, attitude and behaviour scores, hence we state the following hypothesis:

Null hypothesis: Peer education does not improve the knowledge, attitude and behaviour of the patients with diabetes.

Alternate hypothesis: Peer education improves the knowledge, attitude and behaviour of the patients with diabetes.

Statistical analysis

The data collected was coded entered in Microsoft excel sheet (Annexure IV) and tabulated. Statistical analysis was done using SPSS 12 software.Data was analyzed and expressed in terms of rates, ratios and percentages. Mean and Standard Deviation was calculated. Statistical analysis was done using Student's paired and unpaired't' test were used to test the significance of difference between means. When more than two means have to be tested, the technique used was the Analysis of Variance and F test. McNemar's test was used to compare the number of number participants with pre and post test correct scores. A probability value (p value) of less than 0.05 was considered as significant.

Definition of study variables

Age: Age was recorded to the nearest completed year as on last birthday as per information given by the study subject.

Religion: The subject's religion was noted and was grouped as "Hindu", "Muslim", and "Others" (Jain, Boudh, Parsi and Christian etc) as per the information given by the participant.

Type of family [106]

Nuclear family: Married couples, along with their dependent children living in the same house.

Joint family: Many married couples and their children who are living in the same household. All males in the family are blood relatives and all females of the family are related to them by either marriage or blood relation.

Three generation family: Married couple with married children and their kids (three generations) related to each other by direct descent and living together.

Broken family: One where, the couple have separated, or where death has occurred for one or both the spouses.

Socioeconomic status: Information of total monthly income of the family in rupees was obtained as well as the family size. Per capita monthly income in rupees was calculated, and then the family was classified using modified B. G. Prasad's classification.

Modified B. G. Prasad's Classification

Socioeconomic class	Prasad's classification (1961) per capita income in Rs/ month[106]	Modified Prasad's classification in the study period (2011) Per capita income in Rs/month[106]
I	100 & above	4100 & above
II	50 – 99	2050 & 4099
III	30 –49	1230 & 2049
IV	15 – 29	615 & 1229
V	below 15	below 615

Average Consumer Price Index for the year 2011= 841[(106)]

Modification was done with the aid of Multiplication Factor (M.F), which was obtained as below:

$$\text{M. F.} = \frac{\text{Average Consumer Price Index for study period}}{100} \text{ X } 4.93$$

$$\text{M. F.} = \frac{841}{100} \text{ X } 4.93$$

$$= 41.46 \approx 41$$

Educational status: The subjects were asked about their educational qualifications and were grouped into following categories as per NFHS 3 Criteria 2005-06.

Illiterate: A person above seven years, who could not read and write with understanding in any language.

First to fifth: A person who had studied up to fifth standard or a person who can read and write with understanding in any language (without attending the school).

Sixth to Tenth: A person who had studied between sixth to tenth standard.

Tenth plus: A person who had studied beyond 10^{th} standard and attended college/diploma/pre-university.

Graduate: B. A; B. Sc.; B. Ed.; B. Com.; or equivalent degree

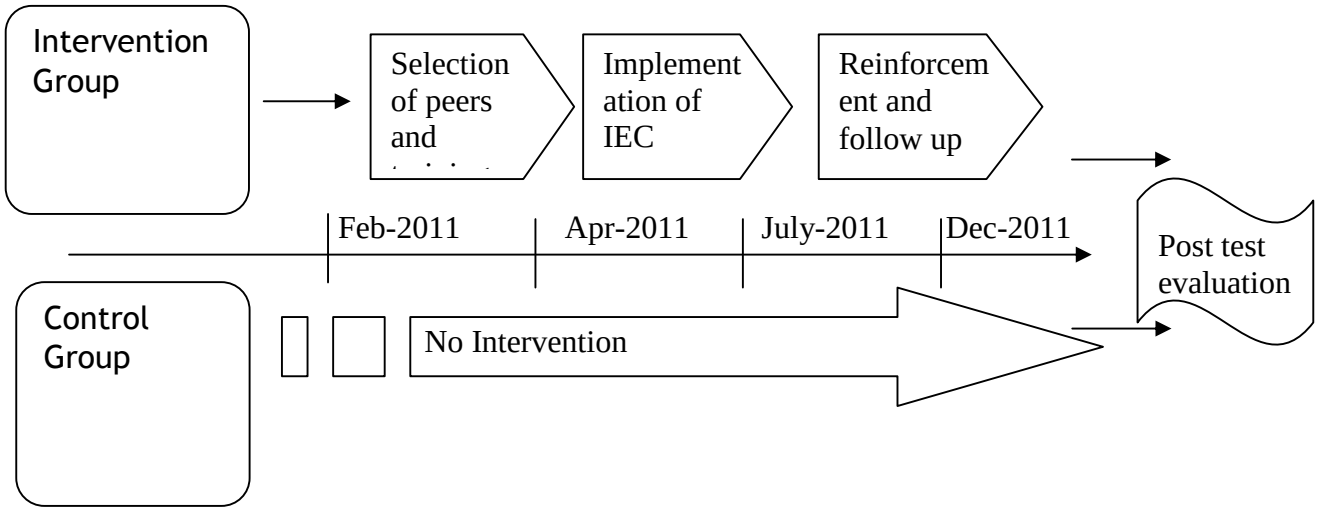


Figure 2: Study design and Methodology

RESULTS

The baseline survey was conducted before the enrolment of study participants to define the study population and to know the prevalence of diabetes in the study community. During the same period the study questionnaire was pilot tested in 10 patients and finalized. All the diabetics were identified and a diabetes register was prepared. The peers were then selected based on the criteria mentioned earlier from the known diabetics.

The study questionnaire adapted was then administered using interview method. This study instrument was divided into two parts:

Part 1 of the study questionnaire contained identification data, family composition and other relevant socio-economic variables for baseline study. Socioeconomic status was assessed using the modified B. G. Prasad classification. The questionnaire was administered by a house-to-house visit and the information was obtained by personal interview with the respondent. Part 1 was administered to all the households that were visited to define the population for obtaining the denominator for the calculation of rates, ratios and proportions.. The households where known cases of diabetes, who were under treatment, were identified and the peer educator of that respective patient were identified.

Part 2 of the study questionnaire consisted of a set of questions to assess the knowledge and skills of the informal care provider in care of a diabetic patient. The objectives of the study were explained to the study participants and the peer educators before administering the questionnaire. The method of administration of the questionnaire was by interview method to the patient and

the peer educators. Approximate date for the educational intervention was discussed with the patient and their peer educators at the end of the interview. After the intervention and post-test evaluation, questionnaire was tabulated, coded and master chart was prepared in Microsoft excel sheet (Annexure IV) and data was analyzed and tabulated as below:

Table 1: Age and sex wise distribution of the total population in the study area

Age in years	Males		Females		Total	
	No.	%	No.	%	No.	%
< 15	1207	30.8	1085	28.8	2292	29.8
16 - 45	1910	48.7	1854	49.2	3765	48.9
46-60	423	10.8	445	11.8	868	11.3
> 60	381	9.7	384	10.2	765	10.0
Total	**3921**	**100**	**3768**	**100**	**7689**	**100**

Majority of the people in the study population were in the age groups of 16 to 45 years. The proportion of males and females in the study population was found to be 50.1% and 49.9% respectively. The least number of people were found in the more than 60 years age group – 10%.

Table 2: Age and sex wise distribution of total number of patients with Type-2 Diabetes

Age Groups in years	Males		Females		Total	
	No.	%	No.	%	No.	%
16 - 45	12	2.9	9	1.5	21	1.9
46 - 60	158	38.5	270	41.6	428	40.5
> 60	240	58.6	369	56.9	609	57.6
Total	**410**	**100**	**648**	**100**	**1058**	**100**

Table 2 shows that majority of the patients in the study population were females 61.25%, whereas males were 38.75%. Of the females, 58.6% were above 60 years of age and among males with Diabetes 56.8% were above 60 years. It can be inferred from table 1 and 2 that the overall prevalence of Diabetes in the study community was 13.75%.

Figure 3: Flow chart of study participants

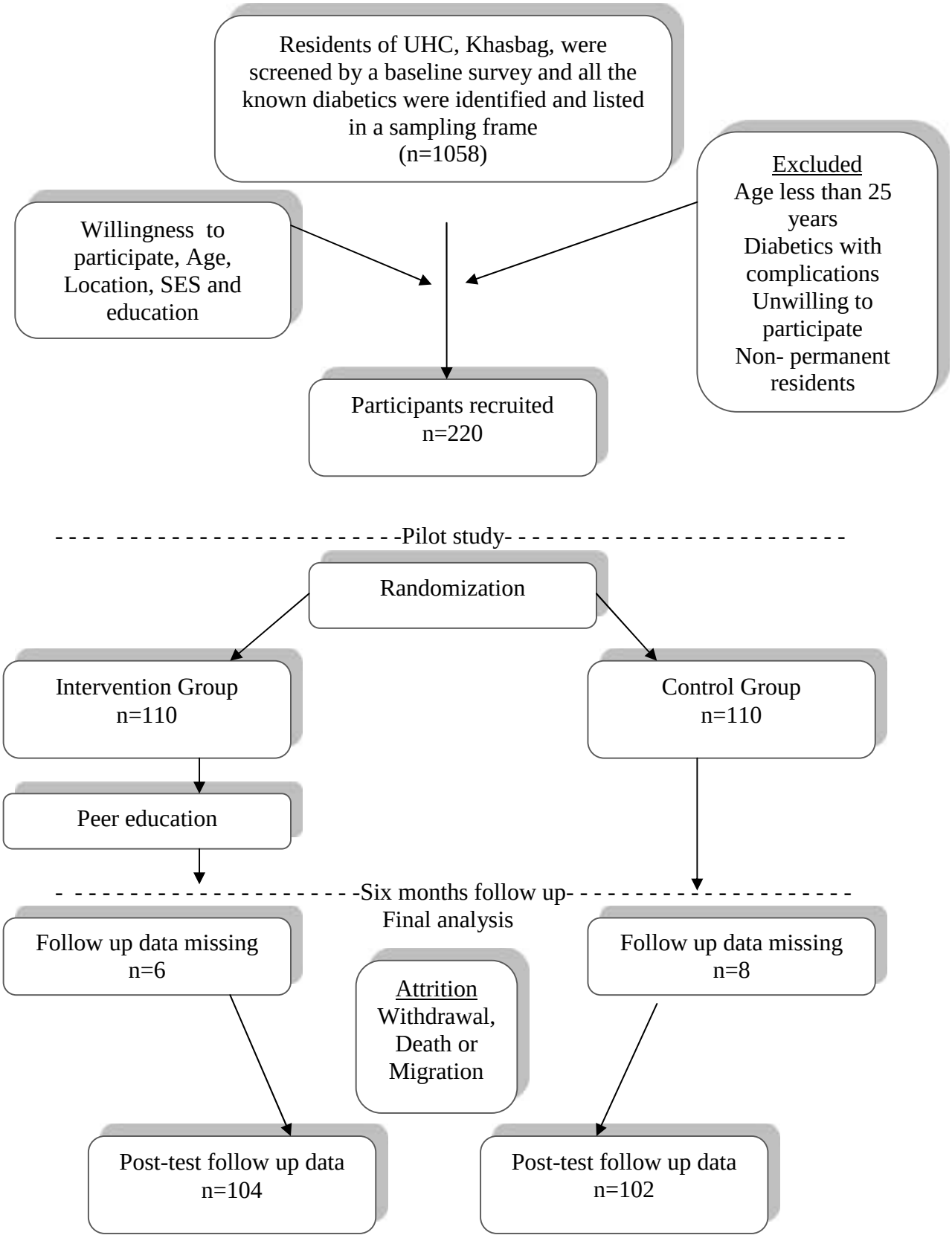


Table 3: Age wise distribution of the study participants with Type-II Diabetes

Age Groups in years	Intervention Group		Control Group		Total	
	No.	**%**	**No.**	**%**	**No.**	**%**
25-35	2	1.8	0	0	2	1
35-45	3	2.7	1	0.9	4	1.8
45-55	17	15.5	16	14.5	33	15
55-65	30	27.2	24	21.8	54	24.5
≥ 65	58	52.8	69	62.8	127	57.7
Total	**110**	**100**	**110**	**100**	**220**	**100**

$x^2 = 4.316$ D.F. = 3 p = 0.229

Age wise distribution of the study participants shows that majority of the study participants both in the intervention and the control group were above the age of 65 years. The age wise distribution of the participants in the intervention and control groups was uniform (p=0.229). However there were two patients with Diabetes in the intervention group compared to none in the control group.

Table 4: Mean Age of the study participants with Type-II Diabetes

Gender	Intervention Group		Control Group	
	Mean Age	**S.D.**	**Mean Age**	**S.D.**
Male	65.48	±13.22	70.17	±12.86
Female	65.61	±12.77	67.11	±12.13
Total	**65.56**	**±12.89**	**68.39**	**±12.47**

t = 1.653 D.F. = 1 p = 0.100

The mean age of the participants in the intervention group was 65.6 years and in the control group the mean age was 68.4 years. There was no statistically significant difference in the mean age distribution of the participants among the Intervention and the control group (p=0.100).

Table 5: Gender wise distribution of the study participants with Type-II Diabetes

Gender	Intervention Group		Control Group		Total	
	No.	**%**	**No.**	**%**	**No.**	**%**
Male	43	39.1	46	41.8	89	40.5
Female	67	60.9	64	58.2	131	59.5
Total	**110**	**100**	**110**	**100**	**220**	**100**

x^2 = 0.170 D.F. = 1 p = 0.680

Majority of the study participants both in the intervention and the control group were females. The intervention group had 60.9% females, whereas control group had 58.2% females. However the gender wise distribution of the study participants was even among both the groups (p=0.680).

Table 6: Distribution of the study participants based on the religion

Religion	Intervention Group		Control Group		Total	
	No.	%	No.	%	No.	%
Hindu	79	71.8	78	70.9	157	71.4
Muslim	24	21.8	25	22.7	49	22.3
Others	7	6.4	7	6.4	14	6.4
Total	**110**	**100**	**110**	**100**	**220**	**100**

x^2 = 0.027 D.F. = 2 p = 0.987

Most of the participants in both the intervention and the control group were Hindus. 71.8% and 70.9% in the intervention and the control group respectively were Hindus. Muslims were 21.8% in the intervention group and 22.7% in the control group. The distribution of the study participants among the intervention and the control group was uniform (p=0.987).

Table 7: Distribution of the study participants based on the Category

Category	Intervention Group		Control Group		Total	
	No.	**%**	**No.**	**%**	**No.**	**%**
S.C.	11	10	12	10.9	23	10.5
S.T.	8	7.3	12	10.9	20	9.1
O.B.C.	16	14.5	16	14.5	32	14.5
Others	75	68.2	70	63.6	145	65.9
Total	**110**	**100**	**110**	**100**	**220**	**100**

x^2 = 1.016 D.F. = 3 p = 0.797

The classification of the study participants belonged to scheduled caste (S.C) ; Scheduled Tribes (S.T), Other Backward Classes (O.B.C); and others showed 10% were S.C. in the intervention group and 10.9% in the control group. 7.3% of the study participants were S.T. in the intervention group and 10.9% in the control group. 14.5% of the study participants were in the O.B.C. group both in the intervention and the control group. There was no statistically different distribution among the groups (p=0.797).

Table 8: Distribution of the study participants based on the Family type

Type of Family	Intervention Group		Control Group		Total	
	No.	%	No.	%	No.	%
Nuclear	86	78.2	87	79.1	173	78.6
Joint	20	18.2	23	20.9	43	19.5
Extended	1	0.9	0	0	1	0.5
Broken	3	2.7	0	0	3	1.4
Total	**110**	**100**	**110**	**100**	**220**	**100**

$x^2 = 0.141$ D.F. = 1 p = 0.707

(Test value calculated excluding Extended and Broken families from both groups)

Most of the study participants in both the intervention and the control groups belonged to nuclear family. 78.2% in the intervention and 79.1% in the control groups belonged to nuclear family. 18.2% in the intervention and 20.9% in the control groups belonged to joint family. There were three broken families and one extended family in the intervention group and none in the control group, however this uneven distribution was not statistically significant (p=0.121 including the extended and the broken families in the analysis).

Table 9: Distribution of the study participants based on the Educational Status

Literacy status	Intervention Group		Control Group		Total	
	No.	**%**	**No.**	**%**	**No.**	**%**
Illiterate	8	7.3	5	4.5	13	5.9
1st-5th std	27	24.5	37	33.6	64	29.1
6th-10th std	26	23.6	24	21.8	50	22.7
11th -12th/diploma	18	16.4	19	17.3	37	16.8
Graduate or more	31	28.2	25	22.7	56	25.5
Total	**110**	**100**	**110**	**100**	**220**	**100**

x^2 = 3.005 D.F. = 4 p = 0.557

The study area being an urban community most of the study participants were literate. There were 7.3% illiterates in the intervention group and 4.5% in the control group. 28.2% were graduates in the intervention group and 22.7% in the control group. There was no statistically significant difference in the educational status of the study participants in the intervention and the control groups (p=0.557).

Graph 1. Distribution of the study participants according to educational status

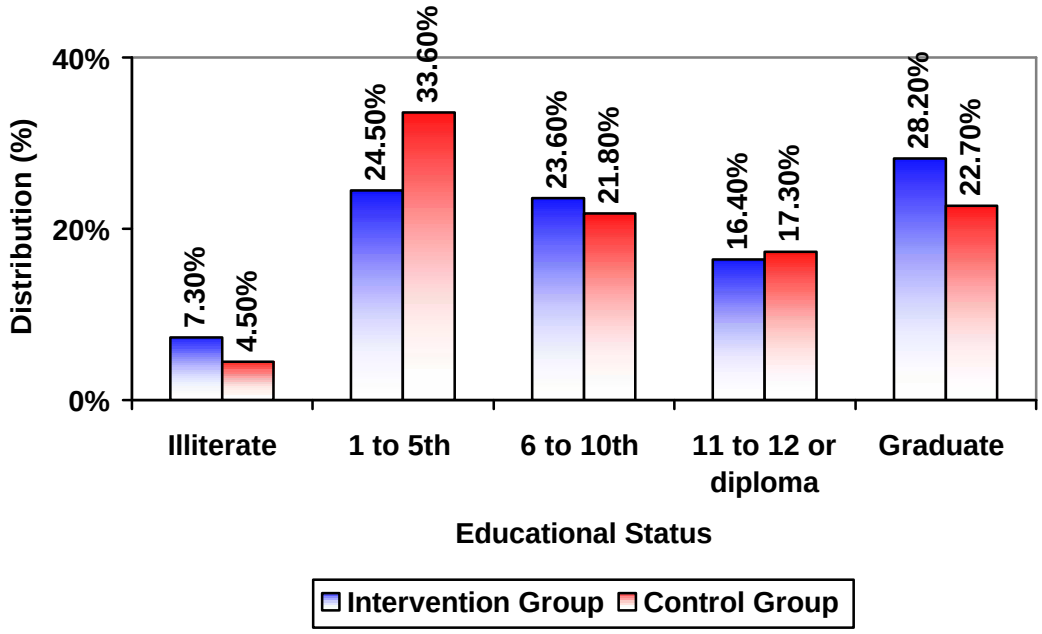


Table 10: Distribution of the study participants based on the Socio-economic status (S.E.S.) as per modified BG Prasad's classification

S.E.S.	Intervention Group		Control Group		Total	
	No.	%	No.	%	No.	%
Class I	14	12.7	11	10	25	11.4
Class II	35	31.8	36	32.7	71	32.3
Class III	14	12.7	19	17.3	33	15
Class IV	17	15.5	17.	15.5	34	15.5
Class V	30	27.3	27	24.5	57	25.9
Total	**110**	**100**	**110**	**100**	**220**	**100**

$x^2 = 1.290$ D.F. = 4 p = 0.86

The distribution of the study participants based on their socio-economic status showed that majority of the study participants both in the intervention and the control groups belonged to Class II according to modified B.G. Prasad's classification. 31.8% and 32.7% in the intervention and the control group belonged to Class II respectively, whereas 27.3% and 24.5% in the intervention and in the control group belonged to Class V. The least number of participants in both the groups belonged to class I, 12.7% in the intervention group and 10% in the control group. However the distribution of the study participants between the intervention and the control group was even (p= 0.86).

Graph 2. Distribution of study population according to socio-economic status

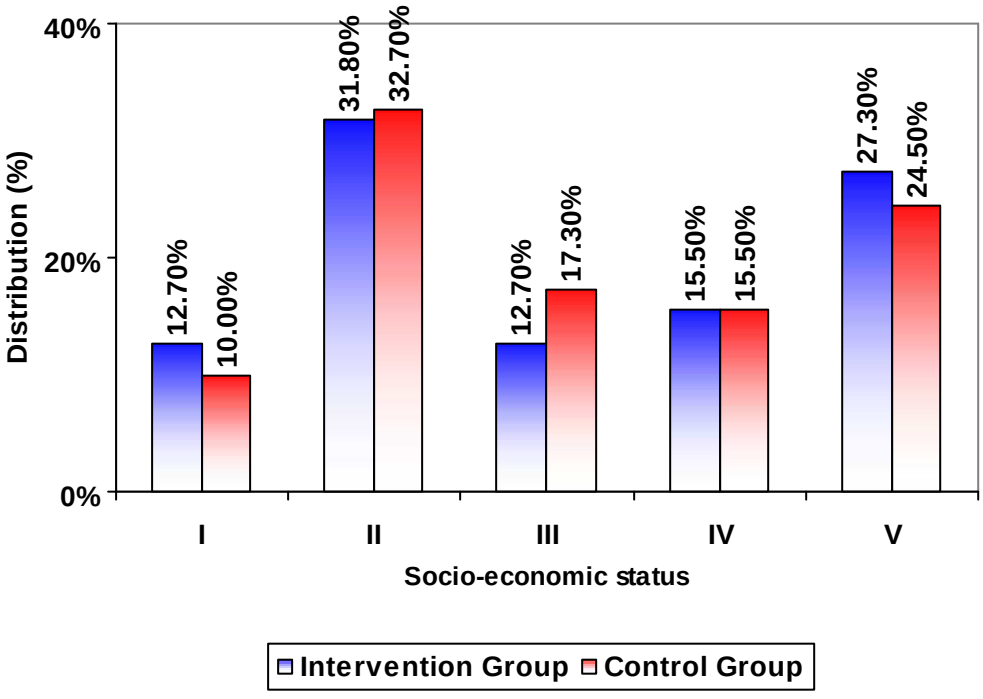


Table 11: Distribution of the study participants based on the duration with Diabetes

Duration with Diabetes in years	Intervention Group		Control Group		Total	
	No.	**%**	**No.**	**%**	**No.**	**%**
Less than 5	33	30	32	29.1	65	29.5
5 to 10	34	30.9	29	26.4	63	28.6
11 to 15	27	24.5	38	34.5	65	29.5
More than 15	16	14.5	11	10	27	12.3
Total	**110**	**100**	**110**	**100**	**220**	**100**

x^2 = 3.200 D.F. = 3 p = 0.362

Distribution of the study participants based on their duration of diagnosis with diabetes shows that in the intervention group 30.9% of the participants were living for 5 to 10 years with diabetes, whereas in the control group most of the participants 34.5% were living with diabetes for 11 to 15 years. 14.5% in the intervention group and 10% in the control group were living with diabetes for more than 15 years. 30% in the intervention group and 29.1% in the control group were living with diabetes for less than 5 years. There was no statistically significant difference between the distribution of the participants based on the duration with diabetes (p=0.362).

Graph 3. Distribution of the study participants based on the duration with Diabetes

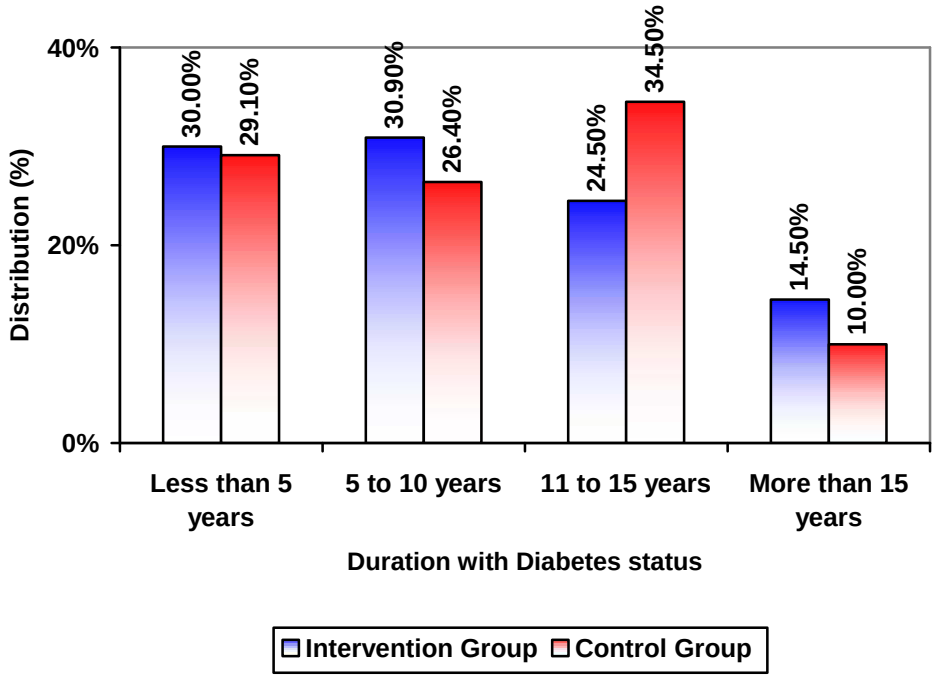


Table 12: Pre-test scores among the study participants

Score Category	Intervention Group (n=110)		Control Group (n=110)		't'	DF	'p'
	Score	S.D.	Score	S.D.			
Knowledge(15)	3.63	±1.21	3.16	±1.29	0.436	218	0.568
Attitude(10)	3.84	±1.01	3.94	±1.11	0.695	218	0.488
Behaviour(5)	3.54	±1.47	3.58	±1.30	0.194	218	0.846
Total(30)	**11.03**	**±2.51**	**10.22**	**±1.84**	**2.724**	**218**	**0.591**

For better analysis the study questionnaire was divided into knowledge, attitude and behaviour sets. The pre-test scores of the study participants in the intervention and the control groups showed that there was no statistically significant difference between two groups (p= 0.591). When the knowledge, attitude and behaviour questions were separately assessed, there was no statistically significant difference between the scores of the two groups. The mean knowledge score in the intervention group was 3.63 and in the control group was 3.16 (p=0.568). The mean attitude score in the intervention group was 3.84 and in the control group was 3.94 (p=0.488) and the mean behaviour score in the intervention group was 3.54 and in the control group was 3.58 (p=0.846).

Table 13: Post-test scores among the study participants

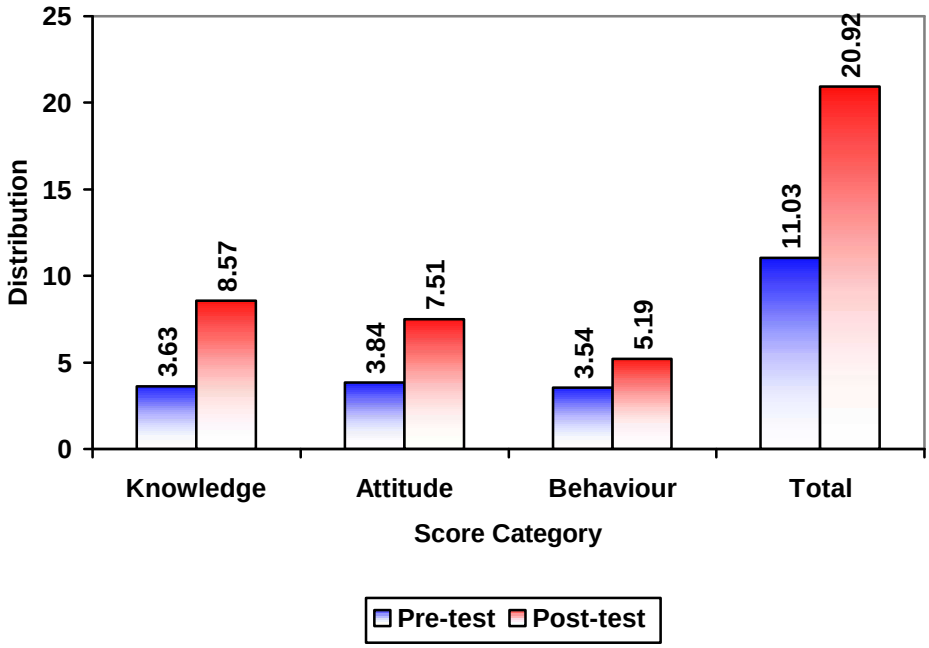
Score Category	**Intervention Group (n=104)**		**Control Group (n=102)**		**'t'**	**DF**	**'p'**
	Score	**S.D.**	**Score**	**S.D.**			
Knowledge(15)	8.57	±0.96	6.77	±1.31	11.218	204	<0.001
Attitude(10)	7.51	±1.12	6.28	±1.44	4.831	204	<0.001
Behaviour(5)	5.19	±1.73	5.78	±2.40	2.030	204	0.54
Total (30)	**20.92**	**±2.34**	**13.05**	**±1.96**	**26.100**	**204**	**<0.001**

The post-test scores of the same study participants after the period of intervention showed that there was a definite improvement in the knowledge, attitude and the behaviour of the participants in the intervention group. The mean total score in the intervention group before the intervention was 11.03 and after intervention it was 20.92. The difference was 9.88, which was statistically significant. When the knowledge, attitude and behaviour scores were assessed separately, it showed that the mean knowledge score in the intervention group after intervention was 8.57 and in the control group it was 6.77, which was statistically significant (p=<0.001). The post-test attitude scores in the intervention and the control group were 7.51 and 6.28 respectively and the difference was statistically significant. However the behaviour scores in the intervention and the control group were 5.19 and 5.78 respectively. The improvement in scores of the intervention group was not statistically significant for behaviour.

Table 14: Mean increase in the scores after intervention

Score Category	Intervention Group (n=104)		Control Group (n=102)		't'	DF	'p'
	Score	S.D.	Score	S.D.			
Knowledge(15)	4.94	±1.45	1.58	±1.20	18.108	204	<0.001
Attitude(10)	3.29	±1.15	2.31	±1.32	5.696	204	<0.001
Behaviour(5)	1.64	±1.59	2.15	±2.13	1.954	204	0.520
Total (30)	**9.88**	**±2.54**	**2.88**	**±2.23**	**20.971**	**204**	**<0.001**

Graph 4. Comparison of pre and post-test scores in the Intervention group



The comparison of pre and post test scores in the intervention group showed that there was a definite improvement in the total scores after intervention. The mean increase in the total score after intervention was 9.88 (±2.54) and the increase was statistically significant in comparison to the pre-test scores. The mean improvement in the knowledge score was 4.94 and the mean improvement in the attitude scores was 3.29 and this improvement was statistically significant ($p =< 0.001$ in both cases). However there was no significant improvement in the behaviour scores in the intervention group ($p=0.052$).

Graph 5. Comparison of pre and post-test scores in the Control group

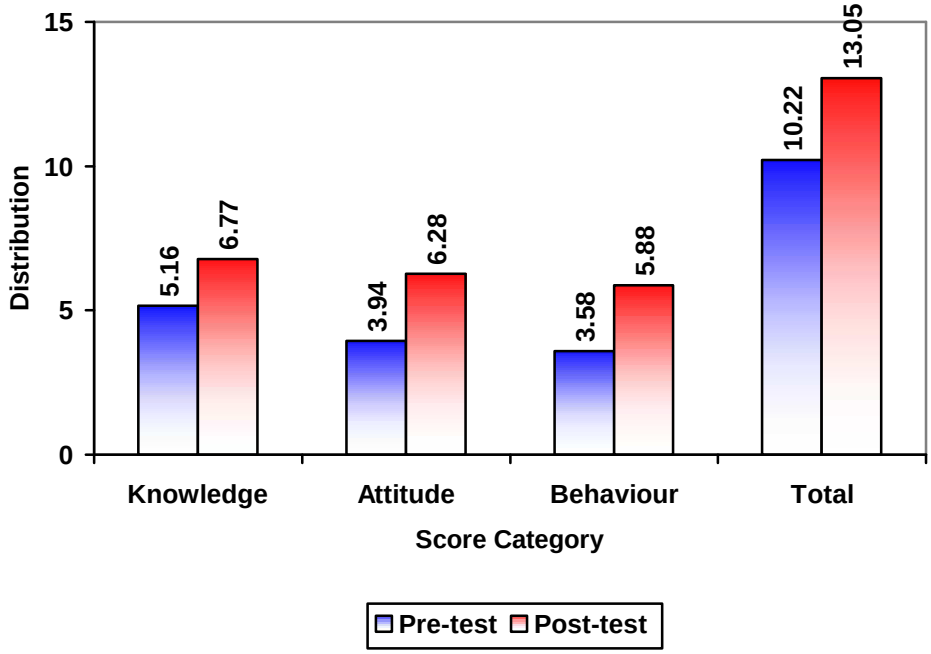


Table 15: Comparison of the knowledge questionnaire using McNemar's test shows a statistically significant difference between pre and post test results in all questions of knowledge after the implementation of peer education. The improvement was marked regarding; what is diabetes and its types, (p=<0.001), Cut off points of high and low blood sugars (p=0.041), symptoms of diabetes, causes, signs and treatment of hypoglycemia and hyperglycemia (p=<0.001), complications associated with and treatment of diabetes (p=<0.001),

Table 15: Comparison of Pre and Post test Knowledge scores of the study participants

Correct answers Knowledge about Diabetes	Intervention Group (n=104)					Control Group (n=102)				
	Pre-test	%	Post-test	%	'p'	Pre-test	%	Post-test	%	'p'
Defines Diabetes and states the Types	40	38.5	55	52.9	0.0003	34	33.4	38	37.2	0.133
Cut off points for High and Low Blood Sugars	18	17.3	24	23.1	0.041	15	14.7	12	11.7	0.247
Lists at least 2 symptoms of Hypoglycemia	12	11.5	46	44.2	<0.001	15	14.7	18	17.6	0.247
Causes of Hypoglycemia	16	15.4	28	26.9	<0.001	13	12.7	15	14.7	0.479
Immediate treatment of hypoglycemia	21	20.2	54	52.0	<0.001	19	18.6	21	20.5	0.479
Lists at least 2 symptoms of Hyperglycemia	9	8.6	21	20.2	<0.001	6	5.8	9	8.8	0.247
Causes of Hyperglycemia	27	25.9	32	30.7	0.074	19	18.6	16	15.1	0.247
Immediate treatment of Hyperglycemia	11	10.6	19	18.2	0.013	15	14.7	25	24.5	0.004
Knows the urine and blood investigations done in Diabetes	34	32.6	68	65.4	<0.001	25	24.5	31	30.4	0.041
Knows the complications in Diabetes	18	17.3	29	27.8	0.002	23	22.5	31	30.4	0.013

Table 16: Comparison of Pre and Post test Attitude scores of the study participants

Correct answers Attitude about Diabetes	Intervention Group (n=104)					Control Group (n=102)				
	Pre-test	%	Post-test	%	'p'	Pre-test	%	Post-test	%	'p'
Believe it can be controlled	18	17.3	26	25	0.013	15	14.8	18	17.6	0.247
Approach to the doctor	21	20.2	35	33.6	<0.001	19	18.6	21	20.5	0.479
Balancing exercise, food and medications	14	13.5	16	15.4	0.479	11	10.8	14	13.7	0.247
Coping with sick days and sick day rules	33	31.7	58	55.8	<0.001	24	23.5	29	28.4	0.074
Importance of Medications	48	46.2	64	61.5	<0.001	39	38.2	35	34.3	0.0133

Comparison of the attitude using McNemar's test shows the changes in the attitude of the intervention group, where a highly significant increase in the percentages of their positive attitude regarding different aspects of diabetes like the fact that it can be controlled though not treated (25%, p=0.013), approach to the doctor, balancing their routine and diabetes (p=0.479), basically living happily with diabetes after the application of the peer education was noticed. (<p=0.001).

Table 17: Comparison of Pre and Post test behaviour scores of the study participants

Correct answers Behaviour about Diabetes	Intervention Group (104)					Control Group (102)				
	Pre-test	%	Post-test	%	'p'	Pre-test	%	Post-test	%	'p'
Role of Diet in Diabetes	18	17.3	38	36.5	<0.001	15	14.4	17	16.3	0.247
Type of meal and foods	4	3.8	9	8.6	0.247	9	8.8	11	10.7	0.247
Importance of exercise	27	25.9	49	47.1	<0.001	24	23.5	27	26.4	0.746
Exercise for 40 mins/ day	14	13.4	12	11.5	0.247	13	12.7	15	14.7	0.746
Eye care in Diabetes	6	5.7	8	7.6	0.247	4	3.9	5	4.9	0.247
Skin and Foot care in Diabetes	11	10.5	13	12.5	0.247	16	15.6	19	18.6	0.247

Comparison of the behaviour questionnaire using Mc Nemar's test shows the behavioural changes brought as about by the peer education programme. There was no significant change in the behaviour scores after the peer education session. Though the knowledge about the role of diet and importance of exercise in diabetes was good ($p<0.001$), there was no change in the type and frequency of meals consumed. The score change for exercise, eye care and foot care was also poor ($p=0.0479$).

Table 18: Impact of peer education on study participants' Random Blood sugar

Random Blood Sugar in mg/dl	Intervention Group (n=104)				Control Group (n=102)			
	Pre-test		Post-test		Pre-test		Post-test	
	N	%	N	%	N	%	N	%
Less than 140	6	5.45	4	3.64	2	1.82	4	3.64
140 - 200	78	70.90	85	77.26	69	62.72	71	64.54
More than 200	26	23.64	15	13.64	39	35.45	35	31.82
Total	**110**	**100**	**104**	**100**	**110**	**102**	**100**	**100**
p	0.854				0.262			

Comparison of random blood sugar values six months after intervention in both the study groups showed that there was no statistically significant reduction in the mean blood sugars in the intervention group (p=0.854). However the number of participants who had random blood sugars more than 200 mg/dl had come down from 26 to 15.

Table 19: Association between gender and difference between pre and post-test scores

Score Category (Mean ±SD)	Intervention Group		Control Group		F (Between sexes)	'p' (Between sexes)
	Male	Female	Male	Female		
Knowledge	3.03 (±1.14)	3.94 (±1.25)	1.45 (±1.42)	1.44 (±1.22)	2.308	0.130
Attitude	3.84 (±0.99)	4.12 (±1.03)	2.25 (±1.03)	2.04 (±1.17)	0.278	0.559
Behaviour	2.25 (±1.25)	4.06 (±1.58)	1.06 (±1.41)	1.22 (±1.20)	0.195	0.004
Total	3.75 (±2.34)	4.05 (±2.60)	1.81 (±1.96)	1.78 (±1.74)	0.282	0.596

The comparison using two way ANOVA, of the improvement in the post test scores based on the gender showed that women had statistically significant improvement in the behaviour scores following intervention (p=0.004). No significant impact of gender was seen on the improvement of the other test scores.

Table 20: Association between age and difference between pre and post-test scores

Score Category	Intervention Group (Age in years)			Control Group (Age in years)			F (Between age groups)	'p' (Between age groups
Mean ±S.D.	< 55	56-65	> 65	< 55	56-65	> 65		
Knowledge	4.68 (±1.55)	4.73 (±1.55)	5.17 (±1.32)	1.43 (±1.15)	1.83 (±1.52)	1.51 (±1.08)	0.640	0.529
Attitude	3.00 (±1.31)	3.70 (±1.05)	3.19 (±1.10)	1.75 (±1.18)	2.00 (±1.10)	2.58 (±1.37)	2.587	0.078
Behaviour	1.32 (±1.21)	2.03 (±1.81)	1.56 (±1.58)	3.12 (±3.42)	1.17 (±1.39)	2.08 (±1.90)	0.662	0.517
Total	**9.00 (±2.14)**	**10.46 (±2.82)**	**9.92 (±2.47)**	**1.87 (±1.78)**	**2.5 (±2.32)**	**3.29 (±2.22)**	**3.522**	**0.031**

For the sake of analysis the study groups were divided into three groups based on age in years as shown above. Using two way ANOVA, Maximum improvement in the total score was seen in the age group of 55 – 65 years 10.46 (±2.82). The age group of more than 65 years showed improvement of 9.92 (±2.47). Improvement in the knowledge scores was seen most in the age group more than 65 years 5.17 (±1.32).

Table 21: Association between the Educational status and difference between pre and post-test scores

Education status Mean ±S.D.	Knowledge		Attitude		Behaviour		Total	
	Int. Grp.	Cntrl. Grp.	Int. Grp.	Cntrl. Grp.	Int. Grp.	Cntrl. Grp.	Int. Grp.	Cntrl. Grp.
Illiterate	4.28 (±2.06)	1.00 (±0.81)	4.14 (±0.69)	2.00 (±0.81)	1.85 (±1.07)	2.5 (±1.29)	10.28 (±2.98)	3.00 (±1.63)
1st-5th std	4.92 (±1.52)	1.48 (±1.12)	3.42 (±1.17)	2.46 (±1.24)	1.69 (±1.49)	1.75 (±1.47)	10.04 (±2.64)	3.03 (±2.32)
6th-10th std	5.00 (±1.51)	1.74 (±1.21)	3.13 (±1.21)	2.09 (±1.16)	1.95 (±2.01)	2.21 (±2.55)	10.08 (±2.77)	2.78 (±2.29)
11th -12th/diploma	5.23 (±1.14)	1.59 (±1.06)	3.00 (±1.06)	2.52 (±1.17)	1.65 (±1.22)	2.06 (±1.25)	9.88 (±2.39)	2.71 (±2.36)
Graduate or more	4.90 (±1.37)	1.66 (±1.52)	3.29 (±1.18)	2.19 (±1.78)	1.32 (±1.64)	2.81 (±3.11)	9.51 (±2.39)	2.86 (±2.17)
F	0.746		0.625		0.381		0.184	
'p'	0.562		0.645		0.822		0.946	

Association using two way ANOVA, of the improvement in the scores with the educational status of the study participants showed that, most improvement in the scores was seen in the illiterate age group 10.28 (±2.98) and the least improvement in the scores was seen in the graduate or more age group 9.51 (±2.39).

Table 22: Association between the Religion and difference between pre and post-test scores

Religion	Knowledge		Attitude		Behaviour		Total	
	Int. Grp.	Cntrl. Grp.	Int. Grp.	Cntrl. Grp.	Int. Grp.	Cntrl. Grp.	Int. Grp.	Cntrl. Grp.
Hindu	4.91 (±1.46)	1.53 (±1.16)	3.33 (±1.14)	2.29 (±1.36)	1.64 (±1.59)	2.25 (±2.37)	9.89 (±2.54)	2.76 (±2.30)
Muslim	5.00 (±1.44)	1.48 (±1.12)	3.29 (±1.16)	2.33 (±1.24)	1.62 (±1.34)	1.83 (±1.46)	9.91 (±2.62)	3.12 (±1.92)
Others	5.00 (±1.41)	2.00 (±0.63)	3.00 (±1.41)	2.50 (±1.38)	1.71 (±2.49)	2.33 (±1.21)	9.71 (±2.63)	3.33 (±2.80)
F	0.298		0.014		0.266		0.139	
'p'	0.742		0.986		0.766		0.871	

Association using two way ANOVA, between the improvements in the post test scores and the religion shows that, most improvement in scores was seen in the group of Muslim participants 9.91(±2.62) and the least improvement in scores was seen in the other religions group. However this difference was not statistically significant.

Table 23: Association between the Socio-economic status (S.E.S.) and difference between pre and post-test scores

S.E.S.	Knowledge		Attitude		Behaviour		Total	
	Int. Grp.	Cntrl. Grp.	Int. Grp.	Cntrl. Grp.	Int. Grp.	Cntrl. Grp.	Int. Grp.	Cntrl. Grp.
Class I	5.00 (±1.35)	1.36 (±1.02)	3.64 (±1.21)	2.27 (±0.78)	1.57 (±1.69)	2.18 (±1.16)	10.21 (±2.69)	3.27 (±1.84)
Class II	4.88 (±1.63)	1.43 (±1.19)	3.18 (±1.23)	2.31 (±1.35)	2.03 (±1.94)	2.53 (±2.21)	10.09 (±2.63)	2.53 (±2.27)
Class III	4.54 (±1.03)	1.88 (±1.53)	3.91 (±0.94)	2.17 (±1.01)	1.36 (±1.28)	2.59 (±3.41)	9.82 (±2.22)	2.88 (±2.36)
Class IV	4.54 (±1.03)	1.88 (±1.53)	3.11 (±0.85)	2.06 (±1.52)	1.29 (±0.98)	2.25 (±1.73)	9.23 (±2.22)	3.62 (±2.36)
Class V	5.20 (±1.34)	1.57 (±1.10)	3.13 (±1.21)	2.57 (±1.52)	1.55 (±1.50)	1.34 (±1.26)	9.59 (±2.74)	2.69 (±2.20)
F	0.248		0.639		1.508		0.174	
'p'	0.910		0.635		0.201		0.951	

Association with the socio-economic status using two way ANOVA, showed that most improvement was seen in the Class I of the S.E.S. group 10.21 (±2.69), whereas least improvement was seen in the Class IV S.E.S. group 9.23 (±2.22).

Table 24: Association between the duration of Diabetes and difference between pre and post-test scores

Duration with Diabetes	Knowledge		Attitude		Behaviour		Total	
	Int. Grp.	Cntrl. Grp.	Int. Grp.	Cntrl. Grp.	Int. Grp.	Cntrl. Grp.	Int. Grp.	Cntrl. Grp.
< 5 years	4.91 (±1.46)	1.64 (±1.33)	3.27 (±1.20)	1.93 (±1.26)	1.57 (±1.45)	2.81 (±2.62)	9.64 (±2.27)	2.06 (±2.14)
5 to 10 years	4.69 (±1.55)	1.46 (±1.26)	3.36 (±1.19)	2.53 (±1.34)	1.88 (±1.57)	1.61 (±1.10)	9.75 (±2.64)	3.61 (±1.93)
11 to 15 years	5.00 (±1.15)	1.60 (±1.11)	3.24 (±1.13)	2.28 (±1.25)	1.40 (±1.60)	1.94 (±2.28)	9.93 (±2.75)	2.88 (±2.33)
> 15 years	5.54 (±1.61)	1.62 (±1.06)	3.31 (±1.11)	3.12 (±1.45)	1.69 (±2.01)	2.50 (±1.69)	10.53 (±2.69)	3.50 (±2.45)
F	0.763		1.592		1.017		1.896	
'p'	0.516		0.193		0.386		0.04	

Association with duration with Diabetes using two way ANOVA, showed that, the maximum improvement in the post-test scores was seen in the age group who were living with diabetes for more than 15 years 10.53 (±2.69). The least improvement was seen in the age group of participants who were living with diabetes for less than 5 years 9.64 (±2.27).

DISCUSSION

This study was conducted in urban field practice area of Khasbag, which is the field practice area under J.N.M.C; Belgaum. The study was conducted on 220 diabetics residing in the area to assess the impact of peer education on their self care practices. This was a randomized control trial with 110 diabetics in the intervention group and 110 diabetics in the control group conducted during the months January 2011 to December 2011.

Prevalence of Diabetes in the study population (Tables 1 & 2)

The age and gender wise distribution of the study population in the present study showed that majority of the people in the study population were in the age groups of 16 to 45 years. The proportion of males and females in the study population was found to be 50.1% and 49.9% respectively. The least number of people were found in the more than 60 years age group – 10%.

This distribution is approximately similar to that of the general population of India, as 45% of the population was in the age group of 15 to 44 years and the proportion of males and females was 47.7% and 45.2% respectively. [106]

The age and gender wise distribution of the study participants with diabetes showed that majority of the patients in the study population were females 61.25% whereas males were 38.75%. Of the females 58.6% were above 60 years of age and among males with Diabetes 56.8% were above 60 years.

WHO in its analysis of Global Burden of Diabetes Mellitus [62] in 1998 has noted that the majority of diabetic patients in developing counties will be in the 45 to 64 years age group. This observation is similar to the observation made in the present study where 97% of the diabetic patients were aged 45 years and above. In the same report it was observed that the female excess was a pronounced in the developed countries (31 million vs. 20 million), but in developing countries the figures were equal i.e. (42 million in each case). Estimates made in the same report have observed that by 2025, the worldwide female excess will decrease (159 million vs. 141 million). However in the present study the prevalence in females was still higher 61.25% compared to males 38.75% as shown in some of the western studies. [62]

The overall prevalence of Diabetes in the study population was found to be 13.75%. This prevalence was compared to the prevalence in different parts of India. Estimated prevalence rates in different parts of urban India are based on national surveys and individual studies, which vary depending on geographical location and year of study.

In the urban population, the Indian Council of Medical Research (ICMR) study in 1972 reported a prevalence of 2.3% (Ahuja 1979), which rose to 12.1% in the year 2000 (Ramachandran et al. 2001). More recently, Mohan et al. (2008) provided estimates from a nationwide surveillance study of T2DM and found that in urban areas there was a prevalence 7.3% of known T2DM and a prevalence of 3.2% in peri-urban/slum areas. Some of the other studies have shown the prevalence as high as 19.5% (Menon et. al. 2006).

Prevalence of Diabetes in different cities of India [5]

Place	Year	Author	Area	Prevalence (%)
Kashmir	2000	Zargar et al. 2000	North	6.1
New Delhi	1972	Ramachandran et al. 2005	North	2.3
New Delhi	1991	Ramachandran et al. 2005	North	6.7
New Delhi	2001	Ramachandran et al. 2005	North	10.3
New Delhi	2005	Prabhakaran et al. 2005	North	15.0
Mumbai	2001	Ramachandran et al. 2001	West	9.3
Jaipur	2003	Gupta et al. 2003	West	8.6
Guwahati	1999	Shah et al. 1999	East	8.3
Kolkata	2001	Ramachandran et al. 2001	East	11.7
Thiruvananthapuram	1989	Raman et al. 1993	South	16.3
Hyderabad	2001	Ramachandran et al. 2001	South	16.6
Bengaluru	2001	Ramachandran et al. 2001	South	12.4
Chennai	2001 2006	Ramachandran et al. 2001 Mohan et al. 2006	South	13.5 14.3
Ernakulam	2006	Menon et al. 2006	South	19.5
Vellore		Raghupathy et al. 2007	South	3.7
Tamil Nadu	2008	Ramachandran et al. 2008	South	18.6
India	2001	Sadikot et al. 2004	NA	5.6
Multi-centric	2008	Mohan et al. 2008 (WHO-ICMR)	Multi-centric	7.1

The prevalence of diabetes across the country varied greatly based on the geographical location and time of the study. The prevalence in the present study population was similar i.e. 13.75%. This prevalence was significantly higher compared to the rural population. The prevalence in India across the cities has also increased over time 2.3% in 1976 to 18.5% off late in 2008.

Socio-demographic characteristics of the study participants (Tables 4 – 12)

The age wise distribution of the study participants in the present study showed that majority of the study participants were above 65 years of age 52.8% followed by above 55 years age group 27.8%. However more than 95% of the participants were above the 45 years age group. The age wise distribution in both the groups was not statistically different (p=0.229).

WHO in its analysis of the Global Burden of Diabetes has estimated that by 2025 a majority of diabetic patients in developing countries will be in the 45 to 64 years age group. These estimates are approximately similar to the ones observed in the present study. The same study points out that if the present trend persists, some 170 million men and women, who will reside in the developing regions of the world, will suffer from diabetes in the most productive years of their lives in less than 30 years from now. [(62)]

Another study in 11 Asian cohorts (2003) including some of the countries with the highest prevalence of diabetes like China, Japan and India showed that the prevalence of diabetes increased with age and reached the peak at 70-89 years of age in Chinese and Japanese subjects, but peaked at 60-69 years of age followed by a decline at the 70 years of age in Indian subjects. At 30-79 years of age, the 10-year age-specific prevalence of diabetes was higher in Indian than in Chinese and Japanese subjects. Indians also had a higher prevalence of Impaired Glucose Tolerance (IGR) in the younger age-groups (30-49 years) compared with that for Chinese and Japanese subjects. Impaired glucose tolerance was more

prevalent than impaired fasting glycemia in all Asian populations studied for all age-groups. [63]

The gender-wise distribution of the study participants showed that, most of the study participants in both the intervention and the control group were females. The intervention group had 60.9% females whereas control group had 58.2% females. However the gender wise distribution of the study participants was even among both the groups (p=0.680).

Some of the similar studies studying the prevalence of diabetes or its risk factors had majority of females. Gender and age specific prevalence and associated risk factors of type 2 diabetes Mellitus in Uyo metropolis, south eastern Nigeria [64] conducted in 2010 had 60% females and 40% males, whereas the studies in India showed higher prevalence among males than in females. [3, 65, 49, 36, 38]

The distribution of the study participants in the present study by religion and category shows that there was no statistically significant difference in the distribution of the study participants in the intervention and the control group. Based on the family type majority of the study participants belonged to nuclear family.

The distribution of the study participants based on their socio-economic status showed that maximum number of diabetics belonged to Class II. A similar report in India showed that the highest prevalence of T2DM in developing

countries occurs in the higher socio-economic groups and this also true for the Indian population. For example, Boddula et al. in 2008 [65] in their research in Kerala, on 1,112 affluent adult Indian subjects found the prevalence of T2DM to be 21.1%, the highest prevalence of T2DM reported from within India to date.

Distribution of the study participants based on their duration of diagnosis with diabetes in the present study shows that in the intervention group 30.9% of the participants were living for 5 to 10 years with diabetes, whereas in the control group most of the participants 34.5% were living with diabetes for 11 to 15 years. 14.5% in the intervention group and 10% in the control group were living with diabetes for more than 15 years. 30% in the intervention group and 29.1% in the control group were living with diabetes for less than 5 years. There was no statistically significant difference between the distribution of the participants based on the duration with diabetes (p=0.362).

Similar studies done carried out in 2011 in England and India showed the analyses of adjusted HbA1c levels revealed that longer diabetes duration and female gender were indicative of poorer self-care. This effect was mediated by contextual and motivational factors as implemented by Self-determination Therapy. Poorer support for self care and independence from practitioners was predominant in girls with longer diabetes duration. Perceived autonomous motivation and self-efficacy were indicative of greater autonomy support, and led to better self-care. [66, 67]

Present study had majority of females and most of them were living with diabetes for more than 10 years, indicating poor self care practices among the study participants. Thus the present study will have the greatest impact on these negligent groups.

Assessing the Impact of peer education (Tables 12-24)

This analysis is a comparison of pre- and six-month post-test scores contained in the questionnaires and uses a one-group pre- and six-month post-program matched group design. As shown in Figure 1 (Methodology), when the analysis was conducted, pre- and six-month post-test questionnaires were completed by 104 in the intervention group and 102 in the control group respectively.

The results showed that there was no statistically significant difference in the pre-test scores between the intervention and the control group (p= 0.591). When the knowledge, attitude and behaviour questions were separately assessed, there was no statistically significant difference between the scores of the two groups. The mean knowledge score in the intervention group was 3.63 and in the control group was 3.16 (p=0.568). The mean attitude score in the intervention group was 3.84 and in the control group was 3.94 (p=0.488) and the mean behaviour score in the intervention group was 3.54 and in the control group was 3.58 (p=0.846).

The pre-test study showed that the majority of the studied patients had low levels of correct knowledge (ranging from 11% to 14%) regarding different aspects of diabetes such as; what is diabetes and its types, symptoms of the

disease, symptoms of hypoglycemia and its immediate treatment, effect of diabetes on the eye and foot and treatment. This finding is consistent with many other studies; CURES (2000) [68] and Murugesan et al. (2007) [69] who conducted their studies in Chennai and parts of south India respectively. The similarity between our finding and those south Indian studies might be justified by common share of the cultural background of diabetic patients despite their geographic variation. Only 38.52% of patients had correct knowledge about symptoms of diabetes. This result is in agreement with Upadhyay et al. (2008) [70] and Perez and Cha (2007) [71] who found nearly similar results among Nepalian patients (37.91%) and Hmong ones (38%).

Concerning type 2 diabetes complications; in the current study the complications assessed included; hypoglycemia, diabetic retinopathy and diabetic foot disease. Though Hypoglycemia is a serious problem with significant morbidity and mortality, yet only 11-15% of the studied patients were aware of the symptoms and causes of hypoglycemia and only 20.2% of them were aware of how to avoid it (Table 15). Thus awareness about diabetes complications in the present study is lower than that reported by many studies; among Libyan patients in 2007 (62.2%), [72] Saudi patients in 2006 (50%) [73] and Omani ones in 1998 (76%)[74]

There is another population based study in southern India in 2007 to find out the levels of awareness on diabetes in urban adult Indian population aged ≥ 20 years details regarding awareness about diabetes.[69] Knowledge regarding causes of diabetes, its prevention and the methods to improve health was significantly low among the general population. In this group, 41% were unaware

of health being affected by diabetes and only less than 30% knew about complications related to kidneys, eyes and nerves. Many persons with diabetes (46%) felt it was a temporary phenomenon. Among the diabetic subjects 92.3% had sought the help of a general practitioner to take treatment. Only a small proportion went to a specialist. [(69)]

The attitude scores of the studied patients towards different aspects of diabetes like balancing their food, exercise and medications, control of diabetes and approach to the doctor was low except that after follow up. These findings are lower than those reported by Kamel et al. (2003) in Ismailia, Egypt [(75)] and by Hussein et al. (1999) [(76)] among diabetics attending outpatient clinic in Cairo, Egypt.

However in the present study, the post-test scores showed a statistically significant improvement in the post-test scores in the intervention group compared to the control group. The total mean improvement in the scores was 9.88. The separate analysis of the knowledge, attitude and behaviour scores also showed improvement in individual component. Improvement was also demonstrated in the control groups, but it was not significant.

After the application of peer education, a significant improvement in knowledge and attitude of the studied group towards all aspects of diabetes was observed (Tables 15 & 16). Most of the patients understood their disease and what they had; they could easily associate the symptoms of hypoglycemia and most importantly knew the immediate measures to be taken once they developed the symptoms. More than 50% of patients in both groups could list modes of blood glucose control, recall the normal blood sugar values, state the purpose of a

diabetes diet, and describe treatment for hypoglycemia. There was a significant difference in the groups' ability after the intervention to list causes of hyperglycemia (Intervention: 18.2%, Control: 24%, p=0.004)) and in their knowledge of urine test and blood tests to treat diabetes. This result is in accordance with Atak (2005) who found marked statistically significant change in the knowledge and attitude of a group of Turkish patients.[77] Moreover, in a Cochrane meta-analysis done in 2008 involving eleven interventional studies an improvement in knowledge of the intervention groups after application of culturally appropriate peer health education was revealed.[78]

Knowledge improvement was seen the most of the study participants. Knowledge improvement contributed the most to the total improvement scores. A systematic review of randomized control trials in 2008 on Diabetes self care [79] showed that most studies measuring changes in diabetes knowledge demonstrated improvement with education, including those with follow-up of 6–12 months after the last intervention contact. A number of studies demonstrated that regular reinforcement or repetition of the intervention seemed to improve knowledge levels at variable lengths of follow-up: Bloomgarden et al. in 1987 [80] (nine visits in 18 months), Korhonen et al.[81] in 1983 (one visit every 3 months for 12 months), Campbell et al. [82]in 1996 (regular reinforcement with visits and telephone calls over 12 months), and Rettig et al. [83] in 1986 (12 visits in 12 months). Knowledge was measured using a variety of instruments, often specifically developed for the study and lacking in documented reliability and validity. [79]

In the present study after the peer education, the attitude of the patients towards the disease was changing. Since the patients understood their disease, most of the patients believed that they can control it. They knew better, when to approach the doctor and the importance of regular medications.

Regarding random blood sugar, in the present study, there was no statistically significant reduction in the mean blood sugars six months after intervention; however the number of patients with Random Blood Sugar more than 200 mg/dl had greatly reduced from 26 (25.5%) during the pre-test, which decreased to 15 (14.7%) during the post-test. (Table: 18) This finding is similar to Duke et al. (2009) in their systematic review also found that patients' knowledge and attitude changes were not enough to imply significant effect in their glycemic control. [84-86] In the systematic review, out of the 9 studies included in the review, only 2 investigated the effect of group education on glycemic control as compared to individual education. They concluded that there was an equal impact on random blood glucose levels at 12 to 18 months. None of the studies in this review compared peer education to usual care by health care personnel. [100] Several studies examined the relationship between skills teaching and glycemic control, although some of these studies [87, 88, 89] noted no corresponding improvement in HbA_{1c}. Wing et al. in 1998 [90] taught adjustment of diet and physical activity in conjunction with SMBG, but the patients in this study failed to show improved glycemic control at 1 year. This result reflects that the changes that occurred in the studied patients concerning their knowledge and attitude towards diabetes were not effective in changing patient’s behaviour regarding diabetes into a healthier one.

In the present study, knowing the role and importance of diet in diabetes was not sufficient to make actual changes in their meal frequency or content. There was no statistically significant change (Table: 17) in the reporting of intake of dietary carbohydrates or fats, nor a decrease in caloric intake or an increase in consumption of lower glycemic-index foods. A few studies demonstrating improved dietary changes found corresponding improvements in weight [91, 92, 93] or glycemic control [94] had an intervention of $\geq$ 18 months. Two studies failed to show improvement in diet: one had an 8-months follow-up and an intervention delivered every 3 months [95], and the other [96] noted improved dietary habits during the intervention but no significant difference at 6 months. Apparently, length of follow-up after completion of an intervention seemed to have a major effect on outcomes, and studies with a follow-up period of ≤ 6 months tended to demonstrate lesser effectiveness.

Similarly knowing the importance of exercise and foot care did not bring about any behavioral changes as evident by the scores. In fact there was no improvement in the number of people who exercised every day after peer education, nor did they take special care of their feet. Several studies examined interventions focusing on foot lesions with mixed results. Litzelman et al. [97] in 1993 noted a decrease in serious foot lesions at 1 year after an intervention consisting of group education, with three follow-up visits, provider guidelines, and chart reminders. Other studies failed to demonstrate improvements with interventions. [83, 98, 99] Studies measuring physical activity outcomes had variable results. Hanefeld et al in 1991 [100] demonstrated an increase in activity at 5 years with intervention. Among studies with shorter follow-up duration, Wood [101]

noted an increase in physical activity at 4 months, Glasgow et al. [102] in 1992 found an increase in the number of minutes of activity 3 months after an intensive intervention and Wierenga [103] in 1994 found improved physical activity after five intervention sessions at four months. However some of the studies also found no changes in physical activity compared with control groups. [104, 87, 105, 90]

Behaviour change was the most difficult to bring about by peer education. Self monitoring of the blood glucose levels, foot care, diet control, regular exercise, approach to health care facilities was the most difficult; however it would be naive to expect that such a change will occur within a short period. It would require continuous efforts in the direction, however small net changes in the favourable direction were seen among the diabetics.

The gist of overall changes that were observed in the outcome measures following the six-month post-program, the participants:

1. had improved knowledge about their disease,
2. had improved communication with their doctor,
3. had a higher level of self-efficacy to manage disease symptoms,
4. believed they can have better health themselves,
5. were less distressed by their symptoms
6. had improved level of knowledge about diet control, exercise and medication

With respect to the behavioural changes, even though none of the changes in the intervention group reached statistical significance, all changes were in the desired direction.

Assessing the impact of gender on the improvement scores showed that females in the intervention group had more improvement compared to the males. This was in contrast to a similar study in which the effects of gender, age, and diabetes duration on diabetes self-care was studied revealed that younger age group and females were the least to show improvement. Similarly in this study the age group of more than 65 years showed the most improvement.

The effect of caste and religion on the improvement scores was insignificant. Similar was the effect of educational status on the improvement scores. The improvement was similar in all the groups suggesting that the level of education did not have a greater effect on the outcome. This could be especially beneficial in the developing countries like India, where the literacy levels are poor and prevalence of diabetes in high. It is the ignorance of the people towards their health that affects the most. Once people are made aware about the greater health impacts of minimal self care, the change in their attitude was noteworthy.

Potential barriers during the study

- Lack of public awareness regarding the severity of diabetes and the importance of Diabetes self management thereby requiring highest degree of motivation for continuation.
- Inadequate and/or lack of financial assistance/compensation to the peers.

Innovative approaches are necessary for the control of diabetes. Health education has especially proved to be effective for some of the other diseases like HIV/AIDS, diarrheal diseases and dental caries. [108, 109, 110] Since peer education

is an innovative and an upcoming method of the heath education model for control of diabetes, this study attempts to actively involve the community in the control of diabetes.

This health education model involved health talks with the diabetics by the peers also showing case histories of the diabetics with complications, sharing personal experience and example of real life case of diabetes. This was followed by slide show to reinforce the message.

The results of this study suggest that peer education can significantly improve the knowledge and behaviour towards diabetes and thus help in the control of the disease. Thus rejecting the null hypothesis. In contrast with other studies by Mohan et. al. [88] and Murugesan et. al. [89] and of the other studies, the basic knowledge regarding diabetes was poor. However after the peer education, the patients could easily associate the signs of diabetes, signs of hypoglycemia, importance of foot care and regular monitoring of blood sugars. Similarly the knowledge about the medical and diagnostic facilities and preventive and personal protective measures was also poor before the health education, suggesting the need to fill this knowledge gap.

Cost effectives ways like this are necessary, especially in India where the government is looking for public-private partnerships and better community involvement, actively involving the people in their own health care can help to deliver the message of prevention better and thereby reduce health burden. What is needed is administrative support and long term evaluations for scaling up of the interventions and policy decisions regarding implementation of such a peer education program. Even though the peers felt overburdened with the curriculum

and teaching and implementation initially, at the end of the study it was found to be acceptable to the peers, the patient's family members and most importantly the patients themselves.

It is rightly quoted by Webber R in the book Disease Epidemiology and Control, U.K; that "*multiplicities of simple methods, carried out by many people are likely to be more successful in the long term than more complex methods. It will be the community who will finally control a disease, but health authorities must advise and assist them in the ways of achieving them"*. [111]

Finally to conclude, since the burden of diabetes will keep on increasing and complications on the rise, a peer based health education model will basically have three important roles in community participation; firstly a better understanding of the disease and concepts to the diabetics and their families, secondly it enforces positive health attitude among the patients and finally it changes positively their health behaviours towards one of the significant health problems of the country, which is amenable for lifestyle modification.

CONCLUSION

Finally to conclude, the prevalence of diabetes in the study area was found to be 13.75% and majority of the patients were in the age group of 45 to 60 years. The proportion of females with diabetes was higher than the males.

Majority of the known diabetics in the intervention and the control group were well qualified, most of them were graduates and belonged to Class II according to modified B.G. Prasad's classification.

The improvement in the knowledge and attitude scores of the patients between the pre-intervention and post-intervention was statistically significant. This improvement in knowledge course had no significant relation to the socio-demographic variables studied. Those study participants with lower levels of education, in fact showed similar levels of improvement as the majority of the well educated patients.

Women showed better self care practices and improvement in the scores compared to men after intervention. The scores improvement was more in the participants who had been living with diabetes for a longer duration of time. Since longer the duration of diabetes, higher are the chances of complications peer education can especially help the more vulnerable women and prevent complications among those in whom it is more likely.

Thus the knowledge and attitude component of the study participants through peer education could be perceived as a **"felt need".** Therefore we can infer that by empowering the peers with the required knowledge and skills in diabetes self care and by linking the care with the system of primary health care it is possible to improve the quality of care, towards

making it more comprehensive than selective and economically beneficial to the patient and the entire health system.

Though there was neither significant improvement in the behaviour scores nor improvement in the blood sugar levels of the study participants after intervention, small net and desirable changes were seen among the participants and it would require continuous and constant motivation to bring about such a change.

Thus this study is significant because it has captured a little known phenomenon, i.e. the impact of Diabetes peer educators as they worked within the community. The successes of the Diabetes peer education and better interactions with the patients can be attributed to the similarity of culture, language and health care experiences. Information gained from this study could be useful in developing policy that would fund peer education to address issues such as access to health care and the prevention and treatment of chronic diseases.

LIMITATIONS

There are important limitations in execution of this study. Internal validity was frequently threatened by

- Lack of blinding of the investigator
- Lack of blinding study subjects
- Loss during follow up despite short follow up period
- Contamination of the control group
- Reliability and validity of the study instrument and questionnaire used to measure knowledge, attitude and self-care practices was not known
- HbA1c would have been a better and more accurate tool to assess the impact following six months of intervention
- No feedback was taken from peer educators
- Randomization of the individual participants was not done to prevent cross contamination of the control groups

RECOMMENDATIONS

- Peer educators can be trained in urban communities to act as link between patients and the health care delivery system to significantly reduce diabetes related complications.
- The peer education programme can be a major initiative designed to introduce cost effective self-care into the existing Health care Service, and has to be been given a high priority.
- More work must be done to identify the factors affecting the blood sugar levels, because knowledge levels and self monitoring of blood glucose do not correlate well with actual reduction of blood glucose.

SUMMARY

The present study was a randomized control trial conducted in urban field practice area of Urban Health Center Khasbag, Belgaum, involving 220 known cases of Diabetes Mellitus on treatment in the age group of 25 to 60 years. The selected study participants were cluster randomized into study and control groups and the clusters were matched for socio-economic status, class, religion, duration with Diabetes and other socio-demographic characters. These study participants in the intervention group were subjected to six sessions of peer education by Diabetic peer educators over a period of six months. These peer educators were trained earlier on all aspects of Diabetes self care. The impact was assessed in the intervention group and compared with the control group using pre and post-test questionnaire.

Socio-Demographic characteristics

The age wise distribution of the study participants showed that majority of the study participants were above 65 years of age 52.8%, followed by above 55 years age group 27.8%. However more than 95% of the participants were above the 45 years age group. The gender wise distribution of the study participants showed that, most of the study participants in both the intervention and the control group were females. The intervention group had 60.9% females whereas control group had 58.2% females. There was no statistically significant difference in the intervention and the control group with respect to the socio-economic status, religion, caste or duration with diabetes.

Most of the study participants in both the intervention and the control group were living with diabetes for 5 to 10 years. Majority of the study participants were females and were living with diabetes for 5 to years. There was no statistically significant difference in both the groups for socio-demographic characters.

Prevalence of Diabetes in the study area

The age and gender wise distribution of the study population showed that majority of the people in the study population were in the age groups of 16 to 45 years. The proportion of males and females in the study population was found to be 50.1% and 49.9% respectively. The least number of people were found in the more than 60 years age group was10%.

The age and gender wise distribution of the study participants with diabetes showed that shows that majority of the patients in the study population were females 61.25%, whereas males were 38.75%. Of the females 58.6% were above 60 years of age and among males with Diabetes 56.8% were above 60 years. Hence the prevalence among females was found to be higher compared to males. The overall prevalence of Diabetes in the study population was found to be 13.75%.

Impact of peer education

Analysis was done to compare the pre- and post-test scores contained in the questionnaires of the intervention group. 14 participants were lost in the follow-up. Peer educators were also asked to complete the questionnaires in the same manner.

The pre-test results showed that there was no statistically significant difference in the pre-test scores between the intervention and the control group. When the knowledge, attitude and behaviour questions were separately assessed, there was no statistically significant difference between the scores of the two groups.

The post-test scores showed a statistically significant improvement in the post-test scores in the intervention group compared to the control group. The total improvement in the scores was 9.88. The separate analysis of the knowledge, attitude and behavior scores also showed individual improvement. Improvement was also demonstrated in the control groups, but it was not statistically significant, suggesting possible contamination due to infeasibility of blinding the participants.

With respect to the behavioural changes, even though none of the changes in the intervention group reached statistical significance, all changes were in the desired direction. Self monitoring of the blood glucose levels, foot care, diet control, regular exercise, approach to health care facilities was the most difficult; however it would be naive to expect that such a change within one session. It

would require continuous efforts in the direction, however small net changes in the favourable direction were seen among the diabetics.

Assessing the impact of socio-demographic features on the outcome scores showed that women in the intervention group had more improvement compared to the men. Similarly in this study the age group of more than 65 years showed the most improvement. The effect of caste and religion on the improvement scores was not significant. Similar was the effect of Educational status on the improvement scores.

Knowledge improvement was seen the most among all the study participants. Knowledge improvement contributed the most to the total improvement scores and behavior score was the least.

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ANNEXURE I - ETHICAL CLEARANCE CERTIFICATE

K.L.E.SOCIETY'S
JAWAHARLAL NEHRU MEDICAL COLLEGE,
NEHRU NAGAR, BELGAUM-590010 (KARNATAKA-INDIA)
(Affiliated to KLE University, Belgaum)

Website: http/www.jnmc.edu
E-Mail : domejnmc@sancharnet.in
: jnmc@sancharnet.in

Phone: (+ 91-(0)831 Office : 2471350
Principal: 2471701
Fax No. +91 (0)831 – 2470759

Ref: MDC/PG/ 2241 **Date: 8/10/2010**

To,

BD011004

Postgraduate Student,

Department of Community Medicine,

J.N.Medical College,

BELGAUM.

Sub: Institutional Ethical Clearance for the study.

Dear

With reference to the above, I wish to inform you that the research project "**IMPACT OF PEER EDUCATION ON SELF CARE IN DIABETES MELLITUS – A RANDOMIZED CONTROL TRIAL IN URBAN FIELD PRACTICE AREA**", is Ethical and justifiable and has been cleared by the departmental Ethical Committee and College Dissertation and Research Committee.

(Dr. V.D.Patil),
Chairman
College Ethical Dissertation
And Research Committee,
J.N.Medical College, Belgaum.

ANNEXURE II – RESEARCH GRANT LETTER

पी.ए.बी.एक्स./PABX : 26588980, 26588707, 26589336, 26589745, 26589873, 26589414
फैक्स/FAX : 011-26588662, 011-26589791, 011-26589258

तार / GRAM : विज्ञानी / SCIENTIFIC
Web-site : www.icmr.nic.in
E-mail : icmrhqds@sansad.nic.in

भारतीय आयुर्विज्ञान अनुसंधान परिषद
INDIAN COUNCIL OF MEDICAL RESEARCH

स्वास्थ्य अनुसंधान विभाग (स्वास्थ्य एवं परिवार कल्याण मंत्रालय)
वी. रामलिंगस्वामी भवन, अन्सारी नगर, नई दिल्ली - 110 029

DEPARTMENT OF HEALTH RESEARCH (MINISTRY OF HEALTH & FAMILY WELFARE)
V. RAMALINGASWAMI BHAWAN, ANSARI NAGAR, NEW DELHI - 110 029

Ms Sandhya Diwakar
Scientist- E

No.3/2/2011/PG-thesis-MPD-18
Dated: 29.3. 2011

BD011004

Community Medicine,
JN Medical College, Belgaum-590010.

Dear Dr.

This is with reference to your application seeking financial assistance from the Council for MD/MS/DM/MCH dissertation thesis entitled "Impact of peer education on self care in Diabetes Mellitus-A Randomized control trial in urban filed practice area".

I am glad to inform you that Director General, ICMR, based on the recommendation of Expert Committee, has sanctioned a sum of Rs.25, 000/- (Twenty five thousand only) to you. Detailed guidelines for availing the same are available on ICMR website i.e. icmr.nic.in and we would appreciate if necessary information per these guidelines may be provided to the undersigned enabling us to release the grant. This is to inform you that Rs. 25, 000/- will be disbursed per the details below:

1. Initial amount of Rs.15, 000/- after receipt of the undertaking as per the guidelines
2. Amount of Rs.5, 000/- on receipt of the electronic copy, hard copy and summary of work done of your dissertation thesis duly approved by the University/Institution along with minimum one publication in a reputed Journal
3. Amount of Rs 5,000/ post receipt of publication information

With best wishes,

Yours Sincerely,

S. Diwakar

(Sandhya Diwakar)
011-26589297, sandhyadiwakar@gmail.com

Received on 08-04-2011

Copy to: Dr. [illegible], Associate Professor, Community Medicine, JN Medical College, Belgaum-590010.

ANNEXURE III

INFORMED CONSENT FORM

K.L.E. UNIVERSITY, BELGAUM,

"IMPACT OF PEER EDUCATION ON SELF CARE IN DIABETES – A RANDOMIZED CONTROL TRIAL IN URBAN FIELD PRACTICE AREA"

Investigator: Dr. **Guide: Dr.**

INTRODUCTION

You are being invited to participate in this study to find out the impact peer education on self care in Diabetes Mellitus in urban field practice area of Belgaum.

EXPLANATION OF PROCEDURE

In this study you will have to answer a few questions which include information on socio-demographic, knowledge, attitude and self care practices in Diabetes Mellitus; the entire procedure may take about 20 to 30 minutes.

If you agree to participate, you will be continued asking questions; but the moment you don't want to continue, then you can leave.

POSSIBLE BENEFITS

The investigator does not promise or guarantee that you will receive benefit being in the study; however it will be aimed at improving your knowledge, attitude and the self care practices regarding Diabetes Mellitus and also will benefit the whole community to acquire knowledge, attitude, and practices about Diabetes Mellitus. This study will also help in future for preventive measures to be taken to reduce the burden of Diabetes Mellitus in the community.

CONFIDENTIALITY: Your identity will not be revealed. All information will be collected and coded, so that no one will know your identity.

WITHDRAWAL: Participation in this study is voluntary. If you don't wish to participate in this study; you will not lose benefits to which you are enrolled. After starting the study, at any time during the study if you feel to withdraw from the study, you are free to do so.

COST OF PARTICIPATION: The cost of study will be borne by the researcher. There will be no additional cost to you for participation in this study.

QUESTIONS:

If you have any questions about this study, you can contact **Dr._____ ,** Postgraduate student, Dept. of Community Medicine, J. N. Medical College, Belgaum, - 590010 Cell: 09242032515 or **Dr. _____.,** Professor, Dept. of Community Medicine, J. N. Medical College, Belgaum – 590010 Cell: 9448294702.

If you have any questions about your rights as a study participant, you may also contact **Dr. V. D. Patil,** Principal, J. N. Medical College & Chairman, Institutional Ethics Committee on Human Subject's Research, J.N.M.C, Belgaum- 590010, Ph. No: 0831-2471702 (O).

ALTERNATIVES

The participant's willingness to participate or not in this study, will not influence the care being provided at Urban Health Centre, Khasbag, Belgaum.

LEGAL RIGHTS

By signing this consent form, you are not waiving any of your legal rights.

PUBLICATION RIGHTS

The result of the survey will be used for teaching and medical publication; however the participant's identity will be kept confidential.

CONSENT STATEMENT

"I volunteer and consent to participate in this study. I have read the content or it has been read to me in the language I can understand. The study has been fully explained to me and I may ask any questions at any time."

CONSENT FROM THE PEER EDUCATOR:

"I volunteer and give my consent to be the peer educator of my group. I have been explained my duties and responsibilities towards my group and the study period in my own language and I have given the consent in my own free will".

1. Signature or Left hand thumb impression _____

(Volunteer subject) and Name_____

2. Signature of person (obtaining consent) _____

And name _____

3. Signature of witness _____

And name _____

Date: _____ Place: _____

ANNEXURE IV

IEC MATERIAL USED FOR INTERVENTION

K.L.E. UNIVERSITY, BELGAUM,

"IMPACT OF PEER EDUCATION ON SELF CARE IN DIABETES – A RANDOMIZED CONTROL TRIAL IN URBAN FIELD PRACTICE AREA"

Diabetes self care education

'Your Health, Your Care, Your Say'

Self care is an integral part of daily life and is all about individuals taking responsibility for their own health and well-being with support from the people involved in their care. Self care includes the actions people take for themselves every day in order to stay fit and maintain good physical and mental health, meet their social and psychological needs, prevent illness or accidents, and care more effectively for minor ailments and long term conditions.

People living with Diabetes can benefit enormously from self care. They can live longer, have less pain, complications, anxiety, depression and fatigue, have a better quality of life, and be more active and independent.

What is it?

Diabetes is a disease where the body cannot produce or use insulin properly. Insulin is a hormone that converts sugar, starches and other food into energy

needed for daily life. There are two main types of diabetes: type 1 and type 2. Approximately 90% of people with diabetes have type 2 diabetes.

Diabetes usually has no symptoms in the early stages. This is why it is known as a silent killer. Diabetes is common among older and obese people. If a patient has the following symptoms they should be referred to a health facility: frequent urination; unusual thirst; extreme hunger; unusual weight loss; extreme fatigue; frequent infections; and wounds which are slow to heal. People who are at the greatest risk of diabetes include: people over 45 years of age; people with a family history of diabetes; people who are overweight; people who do not exercise regularly; and women who had diabetes during pregnancy.

Treatment involves closely managing diabetes by eating balanced meals at regular times and in consistent amounts, being physically active, taking pills, insulin and/or other medicines in order to keep blood sugar, blood cholesterol and blood pressure levels near normal.

Ask your doctor the following questions:

1. Which type of diabetes do I have?

2. Is there an education program that I can attend to learn more about type 2 diabetes?

3. What can I do to lower my blood sugar, blood pressure and cholesterol levels?

Some people who have diabetes think it's not a very serious disease. They may believe that their diabetes is not serious because they got it late in life or because they don't take insulin. There are people who believe that they only have

a "touch" of sugar or "borderline" diabetes. These ideas are not correct – **diabetes is always a serious disease**.

Type 2 diabetes can cause a variety of serious health problems including heart, blood vessel, nerve, kidney, eye problems and foot amputations.

A Journey of A Thousand Miles Begins with the First Step and then is taken Step-By-Step

Caring for your diabetes often means making changes–sometimes lots of them. You may decide to change things about the way you eat and your physical activity level. You may also take pills or learn how to take insulin injections, check your blood sugar, and watch for signs of low and high blood sugar. It's not always easy to make changes in your life, but these are the ideas that can help you.

Checking Your Blood Sugar

Keeping the blood sugars as close to normal as possible helps to prevent the short-term problems of diabetes such as dangerously high levels of blood sugar. It can also prevent or slow-down the worsening of the long-term complications of diabetes such as eye disease and kidney failure. Most people choose a target range for their blood sugar at fasting of not more than 130 mg/dl, or a random blood sugar of not more than 200 mg/dl

The record of blood sugar levels helps your doctor to see how medicines, physical activity, food, sickness, stress and other things affect your blood sugar

each day. With the help of your doctor or the peer educator you can learn to adjust your insulin or other medications, level of physical activity, and meal plan whenever needed.

There are a variety of meters on the market today. Although each works a bit differently, you need a drop of blood from your fingertip or elsewhere to do a check. Once the blood is on the strip, the meter "reads" the level of sugar in your blood. Although most meters have a memory where your latest blood sugar readings are stored, it will be easier for you to look at your numbers if you keep a record or a diary. Your record helps you find patterns in your blood sugar levels. It also helps you to more easily see times when your blood sugar is often above or below your target level, so that you can do something about it.

Ask your doctor the following questions:

1. What blood sugar targets are safe for me?
2. What do my numbers mean?
3. How can I use the results of my blood tests to improve my blood sugar levels?
4. How can I make changes in my medications, meal plan or activity to keep my blood sugar in the target range?

HbA1c: This test shows the **average** level of glucose (sugar) in your blood over the last 6 to 12 weeks. This test can be done in a laboratory at the cost of Rs. 200- 400 . The results give you and your doctor a "picture" of your blood sugar levels for the last 2-3 months. It also gives you an idea of your risk for the eye, kidney and nerve complications of diabetes. In general, a near normal A1C levels means a lower risk for these complications.

Balancing Your Food, Exercise, and Medicines

People with diabetes need to help their bodies keep their blood sugar levels close to normal by carefully balancing food, exercise, stress and glucose-lowering medicine.

Foods with carbohydrates like potatoes, rice, bread, sweets etc. cause your blood sugar to go up. Some foods, like fruit juice and cold drinks, cause your blood sugar to go up fairly quickly. Other foods, like whole grain, pulses, cause your blood sugar to go up more slowly. Your meal plan has different kinds of food to help keep your blood sugar on an even keel. Frequent small meals and avoiding foods rich in sugars is helpful. You can find out how different foods affect your blood sugar by checking your blood sugar after you eat. Having this information helps you make decisions about what to eat.

Exercise will usually cause your blood sugar to go down. If you exercise every day, but miss one day, your blood sugar will probably be higher that day. It also works the other way too. If you usually don't exercise, but one day you are more active than usual, your blood sugar will probably be lower that day.

Activities that you do once in a while, like mowing the lawn, heavy housework or raking leaves, can cause your blood sugar to go down.

Stress also affects your blood sugar. Some people find that their blood sugar is higher when they feel stressed while others find that their blood sugar drops when they feel stressed.

Glucose-lowering medicines, including insulin, also cause your blood sugar to go down. But if your dose of either is too big or you eat less than usual, your blood sugar will get too low. If you forget to take your glucose-lowering medicine or you need a larger dose, your blood sugar will be too high.

Less Is Better

Extra body weight makes diabetes harder to manage. Losing even a small amount of weight (about 5 kgs.) can help lower your blood sugar, blood fats (cholesterol) and blood pressure.

The most obvious way to lose weight is to eat less food. One way you can start is by eating less of the same foods you are eating now. Every bit of food you eat, or do not eat, makes a difference. If you cut back a little at every meal, you will lose some weight. Here are some other ways to eat less food.

Eat less fat. Foods that are high in fat are also high in calories. Too much fat can also damage blood vessels in your heart, brain and legs. Some high fat foods are whole milk, butter, some margarines, cheese, ice cream, meat. Frying foods, and using salad dressings, butter, gravy and sauces, all increase the amount of fat in

your diet. Again, you do not have to give up all of these foods; just think of ways to eat less. For example,

- Bake or broil meats.
- Use low-fat cheese or butter.
- Eat less meat.
- Take the skin off the chicken before eating.
- Use low-fat or skim milk instead of whole milk.

Eat fewer sweets. Sweet foods are usually high in calories. If you like sweets, think about eating smaller portions or trying to find substitutes. Sugar substitutes and avoiding soft drinks help some people cut down on sugar. You do not have to give up all sweet foods - just cutting down how often and how much you eat of these foods will help.

Eat regular meals. Skipping meals may seem like a good way to lose weight – but it usually does not work. When people skip meals, they may feel like they are starving at the next meal and then overeat. It's better to spread your day's food out over the day in three or four smaller meals and snacks, rather than eating one large meal. Try to eat reasonable amounts of food at regular times.

Physical activity is a good way to help burn calories. Walking is one exercise most people can do. If you brisk walk for 30 minutes a day, 5 days a week, you will burn more calories, and lower your blood sugar, blood triglycerides (fat) and blood pressure. Walking 45-60 minutes a day can help you lose weight. Start slowly and gradually add to the amount of exercise you do each day. You do need to check with your doctor before you begin any exercise program.

If you are overweight or obese, losing weight habits is one of the most helpful things you can do for your diabetes and your health in general. A registered dietitian in your community can help you develop a weight loss plan that will work for you.

Ask your doctor the following questions:

1. How would losing weight affect my blood sugar and my health in general?

2. Are there weight loss or exercise programs in the area that would be safe for me?

Glucose Lowering Pills

If you have had diabetes for several years, it is likely that the way it is treated has changed over time. The treatment for diabetes generally goes in steps or stages. The first step is meal planning and exercise and often a glucose-lowering pill. The second step is to add one or more glucose-lowering pills. As time goes on, more glucose-lowering pills or insulin injections are added.

It is important to understand that going from one step to another does not mean that your diabetes is getting worse or that you have not done a good job of caring for it. It simply means that your body needs more help to keep your blood sugar level in the target range.

There is no one best glucose-lowering pill or way to treat diabetes. The best way to manage your diabetes is the way that keeps your blood sugar where you want it and has the fewest side effects.

Coping with Stress

Stress is part of life and we all have things happen to us that are stressful. Too much stress at one time can also cause an overload and causes distress. The body responds to stress by making certain hormones. These can cause the heart to beat faster, the blood pressure to go up, and faster breathing. If this energy is not used to either fight or run away, you may feel tense, tired, or have a headache.

Stress can also affect your diabetes. The hormones your body makes when it feels stress can cause the blood sugar to go up. However, some people find that their blood sugar drops during a stressful event. Either way, stress can make your diabetes harder to manage. It can lead to blood sugars that are too high, too low, or changing often.

Here are some tips that can help you to deal with stress each day.

- Talk about your stress with others.
- Know your limits and don't try to do more than you can.
- Realize that it is okay to cry.
- Realize that it is good to laugh each day.
- Exercise or be more active.
- Take care of yourself and your health.

- Plan your day and set goals you can meet.
- Take breaks during stressful times.
- Don't try to do everything yourself.
- Practice your religion.
- Do fewer things and do them better.
- Avoid stressful situations when possible. If you can't, plan ahead how you will handle the stress.
- Use the energy in other ways. Hobbies, exercise, shopping, or spending time with others can reduce stress.
- Join a support group.

Feeling stressed happens to everyone. Therefore, it is important to learn to cope with stress. Your diabetes management, your overall health and the way you feel about yourself will all be better if you do.

Diabetes and High Blood Pressure

Diabetes and high blood pressure (hypertension) often go hand-in-hand. It is thought that more than half of all people with diabetes also have high blood pressure. High blood pressure, like diabetes, is a lifelong disease and a silent enemy. It can be treated but not cured. If you have both diabetes and high blood pressure, it you need to work closely with your health care team to manage both

If you have diabetes and high blood pressure, you will need to take care of them both. High blood pressure increases your risk for the complications of

diabetes. High blood pressure can speed up the process of hardening of the arteries and kidney disease. This leads to an increased risk of heart attack, stroke, and kidney failure. High blood pressure also weakens blood vessels in the eyes that are damaged from diabetes. Keeping your blood pressure in the target range can help prevent of diabetes eye disease and slow down how fast it progresses. High blood pressure can make blood flow problems in the feet and legs worse. Taking care of your diabetes and high blood pressure can decrease, delay, or sometimes prevent these problems.

Many of the things you do to care for your diabetes will also help lower your blood pressure. Weight loss and regular exercise help manage both diabetes and high blood pressure. Cutting down on salt may help lower blood pressure. With the help and support of your health care team, you can meet the challenge of caring for diabetes and high blood pressure.

Your Blood Fats Can Increase Your Risk for Heart Disease

Blood fats can be risk factors for heart disease. There are 3 types of fats in your blood – "bad" cholesterol or LDL cholesterol, "good" cholesterol or HDL cholesterol and triglycerides. For people with diabetes the desirable LDL cholesterol is 100 (mg/dL). Levels above this target increase your risk for heart disease.

Blood fats are risk factors that can be changed. The first step in changing your blood fats is to find out what your blood fats levels are.

One of the ways to lower your LDL cholesterol is to eat less saturated or hard fat, trans fat and cholesterol like whipped cream, bakery products, fried foods etc. One idea is to find low-fat substitutes for the high-fat foods you eat. Avoid fried foods and eat meats low in fat or trim fat before cooking.

To raise your HDLcholesterol, you can use healthier monosaturated fats such as canola, peanut or olive oil for salads and cooking, eat more cold-water baked or broiled fish and become more physically active.

To lower your triglycerides, you can lower your blood sugar and eat fewer sweets and drink fewer sweet drinks, less alcohol and eat more cold-water baked or broiled fish. Becoming physically active can also lower your triglycerides.

In addition to changes in diet and exercise, many people also take medicines to help manage their blood fats.

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The Eyes Have It!

One of the major dangers of diabetic eye disease is that it can cause serious damage to the eyes before you or your doctor finds out about it. The time to think about diabetes and eye disease is **before** damage occur. Diabetes affects

the small blood vessels in the back of the eye (retina). As time goes on, these blood vessels get weaker and may break. Diabetic retinopathy can cause vision problems and even blindness if not treated.

The sad thing is that much of this blindness could be prevented if the eye disease was found and treated in time. Most people do not have any symptoms of diabetic retinopathy. Blurred vision or trouble seeing is usually a sign of a high blood sugar level, not of a permanent vision problem or damage

First, have a eye exam once a year by an eye care specialist. The only way to know if your eyes are being damaged is by having them checked. This will ensure that any eye disease is found and treated in the early stages.

Second, keep your blood pressure close to the target range of 130/80. High blood pressure can cause narrowing of the blood vessels in the eye. This can speed up the onset of diabetic eye disease. Lowering your blood pressure to the target level can decrease your risk for retinopathy.

Third, keep your blood sugar levels as close to normal as is safe for you. High blood sugar greatly adds to your risk for diabetic eye disease. Keeping your blood sugar close to normal can delay the onset or slow the progression of retinopathy.

Put Your Best Foot Forward

Your head and toes may be at opposite ends of your body but, if you have diabetes, you need to keep your feet in your mind. Diabetes can cause serious problems with your feet, including amputation. Diabetes is the cause of over

70,000 leg and foot amputations every year. The good news is that most of the serious foot problems caused by diabetes can be prevented. Here are five things you can do to care for your feet.

Inspect Daily: Every day, look at your feet for blisters, calluses, cuts, sores, bruises, and cracks in the skin. Look for ingrown toenails, ulcers, and fungus infections such as athlete's foot in the spaces between the toes. It is especially important to look at your toes, in-between your toes, and at the bottoms of your feet. Get help from another person or use a mirror if you cannot see your feet well enough.

First Aid: To treat small cuts, wash, rinse, and cover with a sterile dressing. Avoid using home remedies or colored antiseptics such as iodine or Mercurochrome. If you have a blister, cover it with a sterile pad to protect it from breaking and from rubbing. Stop wearing the shoes that caused the problem. Tell your doctor or foot specialist about any cut, sore, swelling, or redness that does not show signs of healing within 2 to 3 days. Ask your doctor to look at your feet at each office visit. Take off your shoes and socks when you first go into the exam room as a reminder.

Clean and Soften: Wash your feet with mild soap and warm water. Dry gently with a soft towel and rub on lotion or lanolin (except between the toes) to keep feet soft. Wear socks and well-fitting, comfortable shoes that protect your feet. If your feet are too moist, put on baby or talcum powder.

Trim Carefully: Reduce calluses by rubbing with a towel after a bath or with a pumice stone. Do not use store-bought corn or callus removers or razors as these

can cause serious damage. Carefully trim your toenails to follow the shape of your toe. A good time is after a bath when the toenails are soft. Use clippers made for toenails.

Prevent Injuries: Protect your feet by avoiding harsh soaps or chemicals, heating pads and hot water bottles, frostbite, sunburn, and injuries caused by going barefoot. Tight knee socks and knee highs, garters and sitting with your legs crossed for long periods reduce blood flow to your feet and legs. Walking or special leg and foot exercises can help increase blood flow.

Taking care of your feet will allow you to put your best foot forward now and in the future.

Don't Let Your Life Go Up In Smoke

You already know many reasons not to smoke. For example, smoking is the number 1 cause of lung cancer which causes over 160,000 deaths each year. Illnesses related to smoking cause more than 430,000 deaths each year. In fact, smoking is the number one cause for early death. Almost everyone who smokes will damage their health and shorten their lives.

Diabetes is another reason not to smoke. Smoking, alcohol and diabetes are risk factors that greatly increase your chances for heart disease. Smoking and alcohol do a lot of things to your heart – all of them bad. People who smoke and drink alcohol have a 40-90% greater chance of having a heart attack than nonsmokers. Also, when people who smoke have heart attacks, they are more severe than

when nonsmokers have them. Smoking and alcohol makes high blood pressure worse. It also increases the chances of getting angina (severe chest pain caused by not enough blood getting to the heart). Smoking also restricts blood flow to your hands and feet. And, smoking increases your risk for other complications from diabetes, such as diabetic kidney disease.

Enjoy with your Diabetes

Diabetes is a lifelong and a twenty four hour condition. People should learn to live with it and most importantly enjoy it. Enjoying holidays and festivals as a part of life with diabetes is the biggest challenge. But as you grow up, the holidays and festivals become less fun and more work. Of course, part of that is being an adult with adult responsibilities. But when you have diabetes, the holidays can be another reminder of all you need to do that others do not. It's hard to be in the holiday spirit, when you have to worry about taking care of yourself.

Two things about the holiday season make it especially difficult to manage diabetes. The first is food and the second is stress.

It seems that from Sankranthi to Deepawali food is everywhere you go. Although you can't escape it (and who would want to), you can enjoy it and still keep your blood sugar and weight in check and on track. There is no best way or one that will work for everyone, but here are some ideas that have worked for others and might work for you.

Read through the list below and see if any might work for you.

- Plan ahead. Make a conscious decision about what you are going to do.
- Some people ignore their diabetes for a meal or a day, others watch their portion sizes and still others try to stay as close to their usual way of eating as they can. Do what is going to work for you.
- Think about which foods make the holiday special for you. Maybe it's the laddus, or the gulab jamun or your Karanji. Whatever it is, make sure that you eat and enjoy it. An idea that some people find helpful is to eat less or skip the everyday foods (for example mashed potatoes or rolls) so that they have more room for the foods that make the holiday a celebration for them. And when you eat it, take time to really enjoy every bite of that special food.
- Consider modifying some of your recipes to be lower in fat and calories. Most of the time your family won't notice and you are actually doing them a favor.

Taking the time to be more active and staying with your routine as much as possible will pay off when the holiday season is over.

ANNEXURE V – PROFORMA

RESEARCH QUESTIONNAIRE

Investigator: **Guide:**

"IMPACT OF PEER EDUCATION ON SELF CARE IN DIABETES MELLITUS – A RANDOMIZED CONTROL TRIAL IN URBAN FIELD PRACTICE AREA"

[Note: All the personal information provided during this study will be kept confidential. Only aggregated data will be published.]

I] GENERAL INFORMATION: (For all households in field practice area)

Sl. No._____ Pre-test / Post –test
Date of survey._____
Name: _____ Age: _____years
Sex: M \ F
House no: _____ Galli: _____

Religion: Hindu \ Muslim \ Others: Caste: _____

Category: SC \ ST \ OBC \ Others:

Type of family: Nuclear \ Joint \ Extended \ Broken Family size: _____

Total income: Rs_____ / month Per capita Income: Rs_____ / month

Socio-Economic Status (Modified BG Prasad's classification): - I \ II \ III \ IV \ V

Education: Illiterate \ 0-5 yrs\ 6-10yrs \ 11-12yrs or Diploma \ Graduation

II. KNOWLEDGE ABOUT DIABETES: (for diabetic patients >25 years)

1. Diabetes is due to?

a. Infective cause b. Raised blood sugars
c. Religious reasons d. Don't know

2. How many types of diabetes?

a. Four types b. Two Types
c. Only one type d. Don't know

3. What is cut off point for high blood sugar?

a. FBS more than 110 mg/dl, RBS more than 160 mg/dl
b. FBS more than 130 mg/dl, RBS more than 200 mg/dl
c. FBS more than 150 mg/dl, RBS of more than 240 mg/dl
d. Don't know

4. What are the signs and symptoms of high blood sugar?

a. High fever with chills and rigors
b. Thirst, frequent urination and increased hunger
c. Fits, headache and chest pain
d. Don't know

5. What is the cut off point for low blood sugar?

a. Blood sugar less than 70mg/dl
b. Blood sugar less than 80 mg/dl
c. Blood sugar less than 90mg/dl
d. Don't know

6. What are the signs and symptoms of low blood sugar?

a. Fits, headache, chest pain
b. High fever with chills and rigors
c. Patients feel weak, hungry, palpitations, sweats a lot, faints
d. Don't know

7. What should be the normal random blood sugar?

a. RBS between 80 – 120 mg/dl b. RBS between 100 –140mg/dl
c. RBS between 60-100mg/dl d. Don't know

8. What are the causes of increased blood sugar in diabetes?

a. Missing of medication, increased food intake
b. Missing a meal, increased dose of medication
c. Increased exercise, stress and fever
d. Don't know

9. What are the causes of decreased blood sugar in diabetes?

a. Missing a meal / increased dose of medication
b. Missing of medication
c. Increased food intake
d. Don't know

10. What are the investigations to be done in diabetes?

a. Regular chest X-ray
b. Regular urine and blood tests for sugar
c. Regular USG examination
d. Don't know

11. What are the complications of diabetes?

a. Loose stool and vomiting
b. Cough, cold and fever
c. Loss of sensation, muscle weakness, blindness, kidney failure, heart disease
d. Don't know

12. How often should you check your eyes in diabetes?

a. Once in six months b. Once a year
c. Once in two years d. Don't know

13. How should a diabetic patient take his meals?

a. Frequent regular small meals b. Frequent regular large meals
c. Irregular meals d. Don't know

14. How does diet help in controlling diabetes?

a. Improves the strength and nutrition
b. Increases the amount of medication, increases the amount of weight
c. Reduces weight, controls the dose of medication
d. Don't know

15. What type of foods are encouraged in diabetes?

a. Chapati, bread, rice, fruits, vegetables b. Ghee, butter, cheese
c. All fruits d. Don't know

16. What type of foods are discouraged in diabetes?

a. Ghee, butter, fried foods, sweets b. Chapati, bread, ragi
c. Citreous Fruits and vegetables d. Don't know

17. How does regular exercise help to control diabetes?

a. Reduces weight, reduces the amount of medication
b. Increases weight, increases the amount of medication
c. Increases the strength and well being
d. Don't know

18. What is the best daily exercise advised in diabetes?

a. Brisk walking for 40 minutes b. Jogging for 40 minutes
c. Going to the gym for 40 minutes d. Don't know

19. Do you know of any tablets for control of diabetes?

a. Tablets are not necessary b. Oral hypoglycemic tablets
c. There are no tablets available d. Don't know

20. What are the precautions to be taken with tablets?

a. Continue the medication even if you skip a meal
b. Skip the medication if you skip a meal
c. Dose of tablets can be changed depending on how you feel
d. Don't know

21. What are the important sick day rules you know?

a. Skip the medication if you are feeling sick
b. Never stop taking insulin/ medication, see a doctor
c. Dose of medication can be changed depending on how you feel
d. Don't know

22. Diabetes management includes balancing?

a. Food, Activity and insulin/medication
b. Food and insulin / medication
c. Exercise and insulin / medication
d. Don't know

23. When should you go to your family doctor?

a. If you feel weak or hungry often, have palpitations, sweat a lot or faint
b. If you develop swelling, ulcer or loss of sensation
c. Both of the above
d. Don't know

24. Is Diabetes a curable or controllable disease?

a. It is not controllable
b. It is curable
c. It is controllable, but not curable
d. Don't know

25. What is the immediate treatment of high blood sugar?

a. Skip the medication and take rest
b. Take usual medication and immediately visit the family doctor
c. Don't do anything
d. Don't know

26. What is the immediate treatment of low blood sugar?

a. Eat/drink something sweets, should visit family doctor
b. Increase the dose of medication
c. Don't do anything
d. Don't know

27. How is skin care given in Diabetes?

a. Stand in the sun every day
b. By daily oil massage
c. Bathe every day, check skin for sores, red spots and ulcers regularly
d. Don't know

28. How is foot care done in Diabetes?

a. Never wear shoes and slippers
b. Always wear shoes and slippers, outdoor and indoor
c. Wear hard slippers with tight elastic stockings
d. Don't know

29. How do you care for Diabetic foot ulcer?

a. Daily cleaning and dressing with regular checkup for blisters and sores
b. Cleaning and dressing once a week
c. Use local herbal dressing
d. Don't know

30. How is insulin given?

a. As a subcutaneous injection
b. As an intramuscular injection
c. As a tablet
d. Don't know

Thank you very much for your cooperation

1	55	4	2	1	4	1	3	5	1	2	1	0	0	0	1	0	1	0	1
2	61	4	2	1	4	1	2	2	3	2	0	1	0	1	1	1	1	1	0
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22	88	5	2	1	4	1	4	2	2	4	0	0	1	0	0	0	0	1	0
23	52	3	1	1	4	1	4	3	5	1	0	0	1	0	0	0	1	0	0
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43	82	5	1	1	4	1	6	2	4	4	0	0	0	1	0	1	0	1	0
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73	55	3	2	1	1	1	2	5	5	1	0	1	1	0	0	0	0	1	0
74	87	5	2	1	1	1	5	3	4	3	0	1	0	1	0	1	0	1	0
75	91	5	2	1	4	1	3	2	2	4	1	1	0	0	1	0	0	1	0
76	88	5	1	1	2	1	2	1	3	4	0	0	0	0	1	0	1	0	1
77	65	4	1	2	4	1	4	5	5	3	0	0	0	0	1	0	1	0	1
78	63	4	2	1	3	1	6	2	4	4	0	0	0	1	0	1	0	1	0
79	59	4	2	1	4	1	5	3	2	2	0	0	0	1	0	1	0	0	0
80	69	5	2	1	4	1	6	2	1	2	0	1	1	1	1	0	1	0	0
81	47	3	1	2	4	1	5	5	2	1	0	0	0	1	0	0	0	0	1
82	71	5	1	3	4	1	2	3	5	3	1	0	0	0	1	0	1	0	1
83	86	5	2	1	4	2	9	2	5	3	0	0	0	0	1	0	0	0	1
84	50	3	2	1	2	1	2	5	4	1	1	0	0	0	1	0	0	0	1
85	66	5	2	2	4	1	6	4	2	2	0	0	1	0	0	1	0	0	1
86	71	5	1	1	4	1	5	2	3	3	0	1	0	0	1	0	0	0	1
87	86	5	1	1	4	1	4	3	5	4	1	0	0	0	1	0	0	0	1
88	72	5	2	1	4	2	2	5	4	2	1	1	1	0	0	0	0	0	1
89	57	4	2	1	4	1	2	4	1	2	0	0	1	0	0	1	0	1	0
90	66	5	1	2	1	1	6	2	2	3	0	0	0	1	0	1	0	1	0
91	68	5	1	1	4	1	2	3	5	3	0	0	1	0	1	0	1	0	1
92	71	5	1	1	4	1	6	3	5	3	0	0	0	1	0	1	0	1	0
93	56	4	2	3	3	1	2	5	3	1	0	1	1	0	0	0	0	1	0
94	81	5	2	1	3	2	6	4	2	4	0	0	0	1	0	0	1	0	1
95	61	4	1	1	2	1	2	2	5	2	1	0	0	0	0	1	0	0	0
96	56	4	2	2	4	1	1	3	4	1	0	1	0	1	0	0	1	0	1
97	52	3	2	2	4	1	5	5	2	1	0	0	0	1	0	1	0	0	1
98	67	5	2	1	4	1	5	4	3	2	0	0	0	1	0	1	0	1	0
99	75	5	1	2	4	1	5	3	1	3	0	0	1	0	0	0	0	0	1

100	81	5	1	1	3	1	6	3	5	4	1	0	0	0	1	0	1	0	1
101	66	5	2	1	4	3	2	2	4	2	0	1	1	1	0	1	0	1	0
102	71	5	1	1	4	1	4	5	2	3	0	0	0	1	0	1	0	1	0
103	51	3	2	1	4	1	4	4	3	1	1	0	1	0	1	0	0	1	0
104	71	5	1	2	1	2	5	3	2	2	1	1	1	0	0	0	0	0	0
105	61	4	1	1	1	1	5	2	1	2	1	0	1	0	0	0	1	0	1
106	77	5	2	1	4	1	8	5	4	2	0	0	0	1	0	1	0	1	0
107	86	5	2	1	3	1	6	4	5	2	1	0	0	0	1	0	0	1	0
108	88	5	1	1	4	1	4	2	2	3	1	1	0	0	0	0	0	1	0
109	61	4	2	1	4	2	2	3	2	2	0	0	1	1	0	0	1	0	1
110	64	4	2	1	4	1	1	5	2	2	1	0	0	1	0	1	0	1	1

PRE TEST SCORES IN INTERVENTION GROUP

0	4	1	0	1	0	0	1	0	1	0	0	4	0	1	0	1	0	0	0
1	7	1	0	0	0	1	0	1	0	1	0	4	0	0	1	0	1	0	1
0	3	0	1	0	1	0	1	0	0	1	1	5	0	0	1	0	0	1	0
1	5	1	0	0	1	0	1	0	1	0	1	5	0	0	0	1	0	1	0
1	6	0	1	0	1	0	1	0	0	0	1	4	0	1	0	1	0	1	0
0	4	1	0	1	1	0	0	0	1	0	1	5	0	1	0	0	1	0	1
1	4	0	1	0	1	0	1	1	1	0	0	5	0	0	1	0	1	0	1
1	5	0	1	0	1	0	1	0	1	0	1	5	0	0	0	1	1	1	0
1	4	0	0	0	1	0	1	0	1	0	1	4	1	1	0	1	1	1	1
1	4	0	1	1	1	0	1	0	1	0	1	6	0	0	0	1	1	1	0
1	2	1	1	0	0	0	0	0	0	1	0	3	1	0	1	0	1	0	0
0	8	0	0	0	0	0	1	0	1	0	1	3	1	1	0	1	0	1	0
1	4	0	1	0	1	0	0	1	1	1	0	5	1	0	1	0	1	0	0
0	3	0	1	1	1	1	0	0	0	1	0	5	1	0	1	0	1	0	1
1	7	0	1	0	1	1	0	1	0	1	0	5	1	0	1	1	1	1	0
1	5	1	0	1	0	1	0	1	1	1	0	6	1	0	1	1	1	0	1
0	5	1	0	1	0	1	1	0	0	1	1	6	1	1	0	0	0	0	0
1	5	0	1	0	1	0	0	0	1	0	1	4	0	1	0	0	0	1	1
1	5	0	0	0	0	1	0	1	0	1	1	4	0	1	0	1	0	1	1
1	2	0	1	0	1	0	0	0	1	0	1	4	0	1	0	1	1	1	1
0	3	1	0	0	0	1	0	1	0	0	1	4	1	1	0	0	0	0	0
0	2	0	0	0	1	0	0	1	0	1	0	3	1	0	1	0	1	0	0
0	2	0	1	0	0	0	0	1	0	1	0	3	0	0	0	1	0	1	0
0	3	1	0	0	1	1	0	0	1	0	1	5	0	1	0	1	0	1	0
0	3	1	0	1	0	0	1	0	0	0	1	4	0	0	0	0	1	0	0
1	3	1	1	0	0	0	0	1	0	1	0	4	1	0	0	1	0	1	0

1	4	0	1	0	1	0	1	0	0	0	0	3	1	0	1	0	1	0	1
0	2	0	1	0	1	0	0	0	1	0	0	3	0	0	0	0	0	1	0
0	1	1	0	0	1	0	1	0	1	0	0	4	0	0	1	0	0	0	1
0	4	1	1	0	0	1	0	1	0	1	0	5	1	0	0	0	1	0	0
0	3	1	0	0	0	0	1	0	0	0	1	3	0	1	0	0	0	1	0
1	4	0	1	0	0	0	1	0	0	1	0	3	0	0	1	0	1	0	1
1	4	0	1	0	1	0	1	0	1	0	0	4	0	0	0	0	1	0	1
0	3	0	1	0	1	0	1	0	1	0	0	4	0	1	0	0	0	0	0
0	4	0	0	0	1	0	1	0	1	0	1	4	1	1	0	0	0	1	0
0	2	0	1	0	1	0	0	0	1	0	0	3	0	0	0	0	1	0	1
0	2	0	1	0	0	0	0	0	0	1	0	2	0	1	0	1	0	1	0
1	4	0	1	0	0	0	1	0	1	0	1	4	0	0	0	1	0	0	1
0	3	1	0	1	0	1	0	0	0	1	0	4	1	0	1	0	1	1	1
0	3	1	0	1	0	0	0	1	1	0	0	4	0	1	0	0	0	0	1
0	3	0	0	1	0	1	0	0	0	1	0	3	1	0	1	0	0	0	0
0	3	1	0	0	1	0	0	1	0	1	0	4	0	0	1	0	1	0	1
0	3	1	1	0	1	0	1	0	1	0	0	5	1	0	1	0	0	1	0
1	4	0	0	0	0	1	1	1	0	1	0	4	1	0	0	1	0	0	0
1	5	1	1	0	0	0	1	0	1	1	1	6	0	0	1	1	0	1	0
1	3	1	0	1	0	1	0	0	0	0	0	3	1	1	1	0	1	0	1
0	4	0	0	0	1	0	1	0	0	0	1	3	1	0	1	0	1	1	0
0	4	1	0	0	0	1	0	0	0	1	0	3	0	0	0	0	1	0	0
0	2	0	0	0	0	1	0	0	1	0	1	3	0	1	1	0	0	0	0
0	3	1	0	1	0	0	0	0	0	1	0	3	1	0	0	1	0	0	0
0	3	0	1	0	0	0	0	1	0	1	0	3	0	1	0	1	0	1	0
1	4	0	1	1	1	0	0	0	0	0	1	4	1	0	0	0	0	0	1
1	6	0	1	0	0	0	1	0	0	0	1	3	0	0	0	0	0	1	0

0	3	0	0	1	0	1	0	1	0	0	0	3	0	1	0	1	0	0	1
1	4	1	0	0	0	1	0	1	0	0	0	3	1	0	0	0	1	0	1
1	3	0	1	0	1	0	0	0	0	1	0	3	1	0	1	0	0	1	0
1	6	1	0	0	0	0	0	1	1	1	0	4	0	0	0	1	0	0	0
0	4	0	0	1	0	0	1	0	1	0	1	4	0	0	0	1	0	1	0
0	3	1	0	1	0	0	1	1	1	0	0	5	0	1	0	0	0	1	0
1	5	0	0	0	1	0	1	0	1	0	1	4	0	0	0	1	0	1	0
0	2	1	0	0	1	0	0	0	0	0	0	2	1	1	0	0	0	0	0
0	2	0	0	1	0	1	0	1	0	0	1	4	0	1	0	1	1	1	0
1	5	0	1	0	0	1	0	1	0	0	1	4	0	1	0	1	0	0	0
1	2	0	0	1	1	1	0	0	0	1	0	4	1	0	1	1	0	0	1
1	4	0	0	0	0	0	0	0	0	0	1	1	0	0	1	0	0	0	0
1	3	0	1	0	0	0	1	0	1	1	0	4	0	0	0	0	0	0	1
0	2	1	0	0	0	1	0	0	0	0	1	3	0	0	0	0	1	0	0
1	2	0	0	0	1	0	0	1	0	1	0	3	1	0	0	0	0	0	1
1	4	0	1	0	0	0	1	0	0	0	1	3	1	1	0	1	1	0	1
0	4	1	0	1	1	0	0	0	1	0	0	4	0	1	0	0	1	0	1
0	4	0	0	0	1	0	0	1	0	1	0	3	1	1	0	0	1	0	0
0	4	1	0	0	0	1	0	0	1	1	0	4	1	1	0	0	0	1	0

1	4	0	1	0	0	0	0	1	0	1	0	3	1	0	1	0	0	0	1
0	4	1	0	1	0	0	1	1	0	0	0	4	0	1	0	0	0	0	0
1	5	0	1	0	0	0	0	1	0	1	0	3	1	0	0	0	0	1	0
0	3	1	0	0	0	0	1	0	0	0	1	3	0	1	0	0	0	1	0
0	3	0	0	0	1	0	1	0	1	0	0	3	0	1	0	1	0	1	0
1	4	0	0	0	1	0	1	0	1	0	1	4	0	0	1	0	1	0	1
0	2	0	1	0	1	0	0	0	1	1	1	5	0	0	0	1	0	0	0
0	5	1	0	1	0	0	0	1	0	1	1	5	0	0	0	0	1	0	1
0	2	1	0	1	0	0	1	0	1	0	1	5	0	1	0	0	1	0	1
1	5	0	1	1	0	1	1	0	0	0	0	4	1	0	1	0	0	0	0
0	2	0	0	1	0	0	0	0	1	0	1	3	0	0	0	1	0	1	0
0	3	1	0	1	0	0	0	1	0	0	0	3	0	1	0	0	0	0	1
0	3	1	0	0	1	0	1	0	0	0	0	3	1	1	0	0	0	1	1
0	3	1	1	0	0	0	0	1	0	1	0	4	0	0	1	1	1	0	0
0	3	0	0	0	1	0	0	1	1	1	0	4	0	0	1	1	1	1	0
0	4	1	0	0	0	1	0	1	0	0	1	4	0	1	0	1	0	0	0
1	4	0	0	0	1	0	0	0	0	0	1	2	0	0	0	1	0	0	0
0	3	0	1	0	1	0	1	0	1	0	0	4	0	1	0	1	0	1	1
0	4	0	0	1	0	1	0	1	0	1	1	5	0	0	1	0	1	0	1
0	3	0	0	1	0	1	0	0	0	0	1	3	0	0	0	0	0	0	1
0	3	0	0	0	1	1	0	1	0	1	1	5	1	0	1	0	0	0	1
0	3	1	0	0	1	0	1	0	1	0	0	4	1	0	1	0	1	0	0
1	3	0	0	0	1	0	1	0	1	0	0	3	0	0	1	0	1	0	1
0	4	1	0	0	1	0	1	0	1	0	0	4	0	0	1	0	1	0	1
0	3	1	0	0	0	1	1	1	0	1	0	5	1	0	0	1	0	1	0
0	3	0	1	0	1	0	1	0	0	1	1	5	0	0	0	0	1	0	1
1	3	0	0	0	1	0	1	0	0	0	0	2	1	0	0	0	1	0	1

0	4	0	1	0	1	0	1	0	1	0	1	5	0	1	0	0	0	1	0
0	5	0	1	0	1	0	0	1	0	1	0	4	1	0	0	0	1	0	1
1	4	1	1	0	1	0	1	1	0	1	1	7	0	0	0	0	0	1	0
1	5	0	0	1	0	1	0	0	1	0	1	4	0	0	0	1	0	0	0
1	4	0	0	1	0	0	1	0	1	0	0	3	0	1	0	0	0	0	0
0	4	1	0	0	1	0	1	0	1	0	0	4	0	1	0	1	0	1	0
0	3	1	0	1	0	1	0	0	1	0	1	5	1	1	1	1	1	1	0
0	3	1	1	0	1	0	1	0	1	0	0	5	1	0	1	0	1	0	0
0	3	0	1	0	0	0	1	0	1	0	0	3	1	0	1	0	0	0	0
0	4	1	0	1	0	0	0	0	0	0	0	2	1	0	0	1	0	1	0
1	6	0	1	0	0	0	0	0	1	0	0	2	1	0	1	0	0	0	1

1	0	1	4	12
0	1	0	4	15
1	0	1	4	12
1	0	1	4	14
1	0	0	4	14
0	1	0	4	13
0	0	0	3	12
0	0	0	3	13
1	0	1	8	16
1	0	1	5	15
0	0	1	4	9
1	0	1	6	17
1	1	0	5	14
0	0	0	4	12
1	1	1	8	20
1	0	1	7	18
0	0	0	2	13
0	0	0	3	12
1	0	0	5	14
0	0	0	5	11
0	0	0	2	9
1	0	1	5	10
0	0	1	3	8
1	0	1	5	13
0	0	0	1	8
0	0	1	4	11

1	1	0	6	13
0	0	0	1	6
0	1	0	3	8
0	0	0	2	11
0	1	0	3	9
0	0	0	3	10
0	1	0	3	11
0	1	1	3	10
1	0	1	5	13
0	0	0	2	7
0	0	0	3	7
0	0	0	2	10
0	1	0	6	13
0	0	0	2	9
1	0	1	4	10
0	0	0	3	10
0	0	0	3	11
0	0	0	2	10
1	1	1	6	17
0	0	0	5	11
1	1	0	6	13
0	0	0	1	8
1	0	1	4	9
1	0	0	3	9
0	0	0	3	9
1	0	0	3	11
1	0	0	2	11

0	0	1	4	10
0	0	0	3	10
1	0	1	5	11
1	1	1	4	14
1	0	1	4	12
0	0	1	3	11
0	0	0	2	11
0	0	0	2	6
0	0	0	4	10
1	1	1	5	14
0	1	1	6	12
0	0	0	1	6
0	0	0	1	8
0	0	0	1	6
0	0	1	3	8
0	0	0	5	12
0	1	0	4	12
0	1	0	4	11
0	0	0	3	11

1	1	0	5	12
1	1	1	4	12
0	0	1	3	11
1	0	0	3	9
1	0	0	4	10
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0	1	0	4	11
0	0	0	2	11
0	0	0	2	7
0	0	1	3	9
1	0	0	5	11
0	0	0	3	10
0	0	0	4	11
1	0	1	4	12
0	0	1	2	8
1	0	0	5	12
0	0	0	3	12
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0	0	0	3	11
1	1	1	6	13
0	0	0	3	9
0	0	0	3	11
0	0	0	3	11
0	0	0	2	10
0	0	0	3	8

1	1	1	5	14
0	0	0	3	12
1	0	1	3	14
0	0	0	1	10
1	0	0	2	9
0	0	0	3	11
0	0	0	6	14
0	0	0	3	11
1	0	0	3	9
1	0	0	4	10
1	0	0	4	12

PRE TEST SCORES IN CONTROL GROUP

1	48	3	2	1	4	1	5	5	2	1	1	0	1	0	1	0	1	1	1	0	6	0	1	1	1	0	1	1	1	1	1	8	0	0	0	1	0	1	0	0	1	1	4	14
2	66	5	1	1	4	1	2	3	3	3	1	0	1	0	1	1	1	1	0	0	6	0	1	0	1	1	0	0	0	0	0	3	1	0	1	1	1	0	1	0	1	1	7	9
3	78	5	1	1	4	1	4	6	2	3	0	0	0	0	0	0	1	1	1	0	3	0	0	1	0	1	0	0	0	0	1	3	0	1	0	1	1	1	1	1	0	1	7	8
4	56	4	1	2	4	1	6	2	1	1	1	0	1	1	1	1	1	0	0	0	6	1	0	1	0	1	0	1	1	1	1	7	1	0	0	1	1	1	0	0	1	1	6	13
5	55	3	2	1	4	2	7	5	5	2	0	0	0	1	0	1	1	0	0	0	3	0	0	0	0	1	0	1	0	0	1	3	0	1	0	1	1	1	0	0	0	0	4	8
6	82	5	2	1	2	1	5	3	2	4	1	0	0	0	0	1	1	1	1	0	5	1	0	1	0	0	1	0	1	0	0	4	0	0	1	0	1	0	1	0	0	0	3	9
7	62	4	1	2	4	1	1	5	3	2	1	0	0	0	0	0	1	0	0	0	2	0	0	1	0	1	0	1	1	0	1	5	1	1	1	0	0	0	0	0	0	1	4	7
8	82	5	1	3	2	2	4	4	2	3	1	0	1	0	0	0	1	1	1	0	5	1	1	0	1	0	1	0	1	0	1	6	0	0	1	0	1	0	1	0	0	0	3	11
9	51	4	2	1	4	1	4	3	5	1	1	0	0	0	1	1	1	0	0	0	4	0	1	0	1	0	0	0	0	0	1	3	0	1	1	0	0	1	0	1	0	0	4	7
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98	47	3	1	1	2	1	4	1	2	1	1	1	0	0	1	1	0	0	1	1	6	0	1	0	0	1	1	0	0	0	1	4	0	1	0	0	0	0	1	1	0	1	4	10
99	64	4	2	1	2	1	5	3	3	3	1	1	1	0	0	1	0	1	0	1	6	0	0	1	0	1	0	1	0	0	1	4	0	1	0	1	0	0	0	1	0	0	3	10
100	73	5	1	1	4	1	4	5	2	2	1	1	1	0	0	0	1	0	1	1	6	0	0	1	0	0	1	0	0	1	0	3	0	0	0	0	0	1	0	1	0	1	3	9
101	82	5	2	1	4	1	5	2	5	3	0	1	0	1	0	0	1	1	0	1	5	0	0	0	0	1	0	0	1	0	1	3	0	0	0	0	1	0	1	0	0	0	2	15
102	90	5	1	2	4	2	8	3	4	4	0	1	1	1	0	0	0	1	0	1	5	0	1	0	1	0	0	0	1	0	0	3	1	0	0	1	0	1	0	1	1	0	5	8
103	79	5	2	1	4	1	5	5	2	4	1	0	1	0	1	0	1	1	0	1	6	0	1	0	0	0	0	0	1	0	1	3	0	0	0	0	1	0	0	0	0	0	1	11
104	58	4	2	1	3	1	4	5	5	1	0	1	1	1	0	1	1	0	0	0	5	1	0	0	0	1	0	1	0	0	1	4	0	1	0	0	1	0	0	1	0	0	3	9
105	49	3	2	1	2	1	5	5	2	1	1	1	0	0	1	0	1	0	0	1	5	1	0	0	0	0	0	1	0	0	0	0	2	0	1	0	0	0	0	0	0	0	1	11
106	70	5	2	1	4	2	6	3	3	2	0	1	1	1	1	0	0	1	0	0	5	0	1	0	0	0	0	1	0	1	0	1	4	0	0	0	1	0	1	1	0	0	0	3	9
107	84	5	1	1	4	1	4	2	2	3	1	0	0	0	0	1	1	1	1	0	5	0	1	0	1	0	1	0	1	0	0	4	0	1	1	0	1	0	1	0	0	0	4	9
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109	65	5	1	1	4	1	5	3	4	2	1	0	1	1	0	1	0	1	0	1	6	0	0	1	0	1	0	1	0	1	0	4	0	0	1	0	0	1	0	1	1	1	5	13
110	77	5	2	1	4	1	5	2	5	3	1	1	0	0	1	1	1	0	1	1	7	0	0	1	0	1	0	1	0	0	0	3	0	1	0	1	0	1	1	0	0	0	4	10

POST TEST SCORES IN INTERVENTION GROUP

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2	61	4	2	1	4	1	2	2	3	2	1	1	1	1	1	1	1	1	1	1	10	1	1	1	1	1	0	1	1	1	0	8	0	0	0	0	1	1	1	0	1	0	4	22
3	66	5	2	1	4	1	4	5	2	3	1	1	1	1	1	1	1	1	1	0	9	1	1	1	1	0	1	1	1	1	1	9	0	0	1	0	0	1	0	1	0	1	4	22
4	61	4	1	3	4	1	3	2	1	2	1	1	1	1	1	1	0	1	1	1	9	1	1	0	1	1	1	0	1	1	1	8	0	0	1	1	0	1	0	1	0	1	5	22
5	56	4	1	1	4	1	5	3	5	1	1	1	1	1	0	1	1	1	1	1	9	1	1	0	1	0	1	1	0	1	1	7	0	1	0	1	0	1	0	1	0	0	4	20
6	44	2	2	2	4	1	4	2	2	1	1	1	1	1	1	1	1	1	1	0	9	1	1	1	1	0	1	0	1	1	1	8	1	1	0	0	1	1	0	1	1	0	6	23
7	48	3	2	1	2	1	3	1	3	1	0	1	0	1	0	1	1	1	1	1	7	1	1	1	1	1	1	1	1	0	1	9	1	0	1	0	0	1	1	0	0	0	4	20
8	32	1	1	1	4	1	4	2	2	1	1	1	1	0	0	1	1	1	1	1	8	1	1	0	1	1	1	0	1	1	1	8	0	0	0	1	1	1	0	1	0	0	4	20
9	65	5	2	1	4	2	6	2	1	2	1	1	1	1	1	1	1	1	1	1	10	1	1	1	1	0	1	1	1	1	1	9	1	0	1	1	1	1	1	1	0	1	8	27
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11	78	5	1	3	3	2	7	2	5	4	1	1	1	0	1	1	1	1	1	1	9	1	1	0	1	0	1	1	0	1	1	7	1	0	0	0	1	0	0	0	0	1	3	19
12	49	3	2	2	4	1	3	1	2	1	1	1	1	1	1	1	1	1	1	0	9	1	0	1	1	0	1	0	1	1	1	7	1	1	0	1	1	1	0	1	0	1	7	23
13																																												
14	51	3	1	1	4	1	5	2	5	1	1	1	1	1	1	1	1	1	1	0	9	1	1	1	1	1	0	0	0	1	1	7	1	0	1	1	1	0	1	0	0	0	5	21
15	67	5	2	2	4	1	5	5	1	3	1	1	1	1	1	1	1	1	1	1	10	1	1	0	1	1	0	1	1	1	1	8	1	1	1	1	1	1	0	1	1	1	9	27
16	72	5	2	1	2	1	3	5	2	3	1	1	1	1	1	1	1	1	1	1	10	1	1	1	1	1	0	1	1	1	1	9	1	0	1	0	1	1	0	1	0	1	6	25
17	54	3	2	1	2	4	2	4	3	2	1	1	1	1	1	1	1	1	1	0	9	1	1	1	0	1	1	1	0	1	1	8	1	1	1	0	0	0	0	0	0	0	3	20
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19	44	2	1	1	3	1	4	5	4	1	1	0	1	1	1	1	1	1	1	1	9	1	1	0	1	1	0	1	1	1	1	8	1	1	0	1	0	1	0	1	0	0	5	22
20	91	5	2	1	4	1	3	3	1	4	1	1	0	1	1	1	1	1	1	1	9	1	1	0	1	1	0	1	1	1	1	8	0	0	0	1	0	1	1	0	0	1	4	21
21	58	4	1	3	4	1	4	5	2	1	1	0	1	1	1	0	1	1	1	0	7	1	0	1	0	1	1	1	1	1	1	8	1	1	1	1	0	1	1	1	1	0	8	23
22	88	5	2	1	4	1	4	2	2	4	1	0	1	1	1	1	1	1	1	0	8	1	0	0	1	1	0	1	1	1	1	7	1	0	1	0	1	0	1	1	0	1	6	21
23	52	3	1	1	4	1	4	3	5	1	0	1	1	0	1	1	1	1	1	1	8	1	1	1	0	1	0	1	0	1	1	7	0	0	0	1	0	1	0	0	0	1	3	18
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25	77	5	1	1	3	1	4	3	5	3	1	1	1	1	1	0	1	1	1	0	8	1	1	1	0	0	1	1	0	1	1	7	0	0	1	0	1	1	1	0	1	0	5	20
26	65	5	2	2	3	1	5	4	5	2	1	0	1	1	1	1	1	1	1	1	9	1	1	0	1	1	1	1	0	1	1	8	1	0	0	1	0	0	0	1	0	1	4	21
27	48	3	2	1	4	1	3	2	2	1	1	1	1	1	1	1	1	1	1	1	10	1	1	0	1	1	1	0	1	0	1	7	1	1	0	1	1	1	1	0	1	0	7	24
28	70	5	1	1	4	1	6	3	5	3	1	1	1	1	1	0	1	1	1	0	8	1	1	1	1	1	0	1	1	1	1	9	0	0	0	0	0	1	1	0	0	1	3	20
29	67	5	2	1	4	2	8	4	4	1	1	1	0	1	1	1	1	1	0	1	8	1	0	1	1	0	1	1	1	0	1	7	0	1	1	0	0	0	1	0	1	1	5	20
30	55	3	2	2	3	2	5	1	5	1	1	1	1	1	1	1	1	0	1	1	9	1	1	1	0	1	1	1	1	1	1	9	1	0	0	0	1	0	0	0	1	1	4	22
31	70	5	2	1	4	1	5	2	2	3	1	1	1	1	0	1	1	1	1	0	8	1	1	1	0	1	1	0	0	1	1	7	0	1	1	1	0	1	0	0	1	0	5	20
32	57	4	2	1	4	4	2	5	3	2	1	0	1	1	1	1	0	1	1	1	8	1	1	0	1	0	1	1	1	1	1	8	1	0	0	0	1	0	1	1	1	0	5	21
33																																												
34	56	4	2	2	4	1	5	2	5	2	1	1	1	1	1	1	1	1	1	0	9	1	1	1	1	1	0	0	1	0	1	7	1	1	0	1	0	0	0	1	0	1	5	21
35	34	1	2	1	4	1	4	1	4	1	1	1	1	1	1	1	1	1	1	0	9	1	1	1	1	0	1	1	1	1	1	9	1	1	0	1	1	1	0	1	0	1	7	25
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38	91	5	2	1	1	2	9	3	5	4	1	1	1	1	1	1	1	1	1	1	10	0	1	0	1	0	1	0	1	0	1	5	0	0	1	1	0	0	0	1	1	0	4	19
39	68	5	2	1	3	1	3	5	4	3	1	1	0	1	1	1	1	1	1	1	9	1	1	1	0	1	1	0	0	1	1	7	1	1	1	1	1	1	0	0	1	0	7	23
40	78	5	2	2	1	1	5	4	1	3	1	1	1	1	1	1	1	1	1	0	9	1	0	1	0	0	1	1	1	0	1	6	0	1	0	0	0	0	1	1	0	1	4	19
41	64	4	2	1	4	1	3	3	2	2	1	1	1	1	1	0	1	1	1	1	9	0	1	1	0	1	0	1	0	1	1	6	1	0	1	0	1	0	0	1	1	1	6	21
42	43	2	1	1	2	1	3	5	5	1	1	0	1	1	1	1	1	1	1	0	8	1	0	0	1	0	0	1	1	1	0	5	0	0	1	0	1	0	1	0	0	0	3	16
43	82	5	1	1	4	1	6	2	4	4	1	1	1	1	1	1	1	1	1	1	10	1	1	1	1	1	1	0	1	1	1	9	1	1	1	0	1	1	0	0	0	0	5	24
44	56	4	2	1	4	1	2	5	5	2	1	0	1	1	1	0	0	1	1	1	7	0	0	1	0	1	1	1	0	1	0	5	1	0	0	1	1	0	0	0	0	0	3	15
45	49	3	1	2	2	2	6	4	2	1	1	0	1	1	1	0	1	1	1	1	8	1	1	0	0	1	1	0	1	1	1	7	0	0	1	1	0	1	0	1	1	1	6	21
46	57	4	2	1	1	1	6	3	3	1	1	1	1	0	0	1	1	1	1	1	8	1	0	1	1	1	1	0	0	1	0	6	1	1	1	1	1	0	1	1	0	0	7	21
47	62	4	2	1	4	1	3	5	2	2	1	0	1	1	1	1	1	1	1	0	8	0	0	1	1	0	1	1	1	1	1	7	1	0	1	1	1	1	1	1	1	0	8	23
48	74	5	1	1	4	1	4	2	5	3	1	1	1	1	1	1	1	1	1	1	10	1	0	1	1	1	0	0	1	1	0	6	0	0	0	0	1	0	0	0	1	0	2	18
49	61	4	1	3	4	2	8	4	4	1	1	1	0	1	1	1	1	1	1	0	8	0	1	0	0	1	1	0	1	1	1	6	0	1	1	0	0	0	0	1	0	1	4	18
50	59	4	2	1	3	1	2	5	1	2	1	1	1	1	1	1	1	1	1	0	9	1	1	1	1	0	1	0	0	1	0	6	0	0	0	1	0	0	0	1	1	0	3	18
51	75	5	2	1	4	1	6	3	2	3	1	1	1	1	1	1	1	1	1	0	9	0	1	1	0	0	0	1	1	1	0	5	0	0	0	0	0	1	0	0	0	0	1	15
52	51	3	2	1	3	1	2	2	5	1	1	1	1	1	1	1	1	1	1	1	10	0	1	1	1	0	0	1	0	1	1	6	1	1	0	0	0	1	1	1	0	1	6	22
53	68	5	1	2	4	2	3	5	4	3	1	1	1	1	1	1	1	1	1	1	10	0	1	1	1	0	1	0	0	0	1	5	0	0	0	0	0	1	0	1	0	0	2	17
54	72	5	2	2	4	1	4	4	5	2	1	1	1	1	1	1	1	0	1	0	8	0	0	1	1	1	1	1	1	1	0	7	0	1	0	1	0	0	1	0	0	1	4	19
55	56	4	2	1	4	1	2	3	2	1	1	1	1	1	1	0	1	0	1	1	8	1	0	0	0	1	0	1	0	1	1	5	1	1	1	1	1	1	0	0	0	1	7	20
56	60	4	1	1	4	1	3	5	1	2	1	1	0	1	0	1	0	1	1	1	7	0	1	0	1	0	1	1	1	1	1	7	1	1	1	1	1	1	0	1	1	1	9	23
57																																													
58	66	5	2	2	4	2	12	5	2	3	1	1	1	1	1	1	0	0	1	0	7	0	0	1	1	1	1	0	1	0	1	6	0	1	0	1	1	1	0	1	0	1	6	19
59	78	5	2	2	4	1	3	4	5	3	1	1	1	1	1	1	1	0	1	0	8	1	0	1	1	0	1	1	1	1	0	7	0	1	0	0	1	1	0	1	0	1	5	20
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61	83	5	2	1	1	4	1	5	5	4	1	1	1	1	1	1	1	1	1	0	9	1	0	0	1	0	1	1	0	1	1	6	1	1	1	0	1	0	0	0	1	0	5	20
62	55	3	2	1	1	2	1	4	5	1	1	1	1	1	1	1	1	1	1	0	9	0	0	1	0	1	0	1	1	1	1	6	0	1	1	1	1	1	0	0	0	0	5	20
63	52	3	1	3	4	1	2	2	2	1	1	1	1	1	1	1	1	1	1	1	10	0	1	0	0	1	0	1	0	0	1	4	0	1	1	1	1	1	1	1	1	1	9	23
64	69	5	1	1	3	1	4	3	2	3	1	1	1	1	1	1	0	1	1	1	9	0	0	1	1	1	0	1	1	1	0	6	1	0	1	1	0	0	1	0	1	1	6	21
65	71	5	2	2	4	1	6	2	1	3	1	1	1	1	0	1	1	1	1	1	9	0	0	0	1	1	0	0	1	1	1	5	1	1	1	0	0	0	0	0	0	0	3	17
66	86	5	1	2	4	2	2	5	2	4	1	1	1	1	1	1	1	0	1	1	9	0	1	0	1	0	1	1	1	1	0	6	0	0	1	1	1	0	1	1	0	1	6	21
67	57	4	2	1	4	1	6	1	2	2	1	1	1	1	1	1	0	1	1	1	9	1	0	0	0	1	1	1	0	1	1	6	0	1	0	1	1	0	1	0	1	0	5	20
68																																													
69	73	5	2	1	3	2	8	2	2	3	1	1	1	1	1	1	1	1	0	1	9	1	1	1	0	0	1	1	0	1	1	7	1	1	1	1	1	0	1	1	1	1	9	25
70	59	4	2	1	4	1	8	3	5	1	1	1	1	1	1	1	1	1	0	1	9	1	1	1	0	1	1	1	1	0	1	8	1	1	0	1	1	1	1	0	1	0	7	24
71	64	4	1	1	4	1	5	5	3	1	1	0	1	1	1	1	1	1	1	1	9	1	0	1	1	0	1	1	1	1	1	8	1	0	0	1	1	0	0	0	1	0	4	21
72	71	5	1	2	4	2	2	4	2	2	1	1	1	1	1	1	1	0	1	1	1	9	1	0	1	0	1	0	1	1	1	0	6	1	1	1	0	0	1	0	0	0	0	4	19
73	55	3	2	1	1	1	2	5	5	1	1	1	1	0	1	1	0	1	1	1	8	1	1	0	0	0	1	1	1	1	1	7	1	0	1	1	0	0	1	1	1	0	6	21
74	87	5	2	1	1	1	5	3	4	3	1	1	0	1	1	1	1	1	0	1	8	1	0	1	1	1	1	1	0	0	1	7	0	1	0	0	0	1	1	1	1	1	6	21

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76	88	5	1	1	2	1	2	1	3	4	1	1	1	0	1	1	1	1	1	1	9	1	1	1	1	0	1	1	0	1	1	8	0	1	1	0	0	1	0	1	1	0	5	22
77	65	4	1	2	4	1	4	5	5	3	1	1	0	1	1	1	1	1	1	0	8	1	0	1	1	0	1	1	1	0	1	7	1	1	0	1	0	1	0	1	0	0	5	20
78	63	4	2	1	3	1	6	2	4	4	0	0	0	1	1	1	0	1	1	1	6	1	0	0	1	1	1	1	1	0	1	7	1	0	1	0	0	0	1	0	0	0	3	16
79	59	4	2	1	4	1	5	3	2	2	1	1	1	1	1	1	0	1	1	1	9	1	1	0	0	1	1	1	0	1	1	7	1	1	1	1	0	1	0	1	0	1	7	23
80	69	5	2	1	4	1	6	2	1	2	0	1	1	1	1	0	1	1	1	1	8	1	1	1	1	0	1	0	0	0	1	6	0	0	0	0	0	1	1	0	1	1	4	18
81	47	3	1	2	4	1	5	5	2	1	1	1	1	1	1	1	1	1	1	1	10	1	1	0	1	1	1	0	0	1	1	7	0	0	1	1	0	0	0	0	1	0	3	20
82	71	5	1	3	4	1	2	3	5	3	1	1	1	0	1	1	1	0	1	1	8	0	1	1	1	1	1	1	0	1	0	7	1	0	1	0	0	0	0	0	0	0	2	17
83	86	5	2	1	4	2	9	2	5	3	1	0	1	1	1	1	1	1	1	1	9	1	1	1	1	0	1	1	0	0	1	7	0	0	0	1	1	1	1	1	1	0	6	22
84	50	3	2	1	2	1	2	5	4	1	1	1	0	1	1	0	1	1	1	0	7	1	1	0	1	0	0	1	1	1	0	6	0	1	0	0	1	0	1	0	1	1	5	18
85	66	5	2	2	4	1	6	4	2	2	1	1	1	1	1	1	0	1	1	0	8	1	0	1	1	1	1	0	1	1	0	7	1	1	1	1	1	1	0	1	0	0	7	22
86	71	5	1	1	4	1	5	2	3	3	1	1	0	1	1	0	0	1	1	1	7	1	1	1	1	1	0	1	1	1	0	8	0	0	1	0	1	0	0	0	0	0	2	17
87	86	5	1	1	4	1	4	3	5	4	1	1	1	1	1	1	1	0	1	1	9	0	1	1	1	1	0	0	1	1	0	6	1	1	1	1	1	1	1	1	0	0	8	23
88	72	5	2	1	4	2	2	5	4	2	1	1	1	1	1	1	1	1	1	0	9	1	1	1	0	1	0	1	0	1	1	7	0	1	0	1	1	1	1	0	0	1	6	22
89	57	4	2	1	4	1	2	4	1	2	1	1	1	1	1	1	1	1	1	1	10	0	1	1	1	0	1	1	1	0	1	7	0	0	1	1	0	1	0	1	1	1	6	23
90	66	5	1	2	1	1	6	2	2	3	1	0	1	1	1	1	1	1	1	0	8	1	1	1	1	1	1	1	1	1	0	9	0	1	0	1	1	1	1	1	1	0	7	24
91	68	5	1	1	4	1	2	3	5	3	1	1	1	0	1	1	1	0	1	1	8	0	1	1	1	1	0	1	1	0	1	7	0	0	1	0	1	0	1	1	0	1	5	20
92																																												
93	56	4	2	3	3	1	2	5	3	1	1	1	1	1	1	1	1	1	0	1	9	1	0	1	1	1	1	1	1	1	1	9	1	1	1	0	0	1	0	0	1	0	5	23
94	81	5	2	1	3	2	6	4	2	4	1	1	1	1	0	1	1	1	1	0	8	1	1	0	1	1	1	0	0	1	1	7	1	1	1	0	1	1	0	1	1	1	8	23
95	61	4	1	1	2	1	2	2	5	2	1	1	1	1	1	1	1	1	1	1	10	1	1	0	1	1	1	1	1	1	0	8	0	0	1	1	1	1	1	1	0	1	7	25
96	56	4	2	2	4	1	1	3	4	1	1	1	1	1	1	1	1	0	1	1	9	1	1	0	1	1	1	1	1	0	1	8	0	1	0	1	1	0	1	1	0	0	5	22
97	52	3	2	2	4	1	5	5	2	1	1	1	1	0	0	1	1	1	1	1	8	1	1	1	1	1	1	1	1	1	0	9	1	0	0	1	1	1	1	0	1	0	6	23
98	67	5	2	1	4	1	5	4	3	2	1	1	0	1	1	1	0	1	1	1	8	1	1	1	1	1	1	0	1	0	1	8	0	0	1	1	1	0	1	0	1	0	5	21
99	75	5	1	2	4	1	5	3	1	3	1	1	1	1	1	0	1	1	1	1	9	1	0	1	1	1	1	0	1	1	0	7	1	0	1	1	1	1	1	1	0	0	7	23
##	81	5	1	1	3	1	6	3	5	4	1	0	1	1	1	1	1	0	1	1	8	0	1	1	1	0	1	1	1	1	1	8	0	0	0	0	0	0	1	1	1	1	4	20
##	66	5	2	1	4	3	2	2	4	2	0	1	1	1	1	1	0	1	1	1	8	1	1	1	1	0	1	1	0	1	1	8	1	0	0	0	1	0	1	0	1	0	4	20
##	71	5	1	1	4	1	4	5	2	3	1	0	1	1	1	1	1	1	0	1	8	1	1	0	1	1	1	1	1	1	1	9	0	0	0	0	0	1	1	1	0	1	4	21
##	51	3	2	1	4	1	4	4	3	1	1	1	1	1	1	1	1	1	1	1	10	1	0	1	0	1	1	1	1	1	1	8	0	1	0	1	1	0	0	0	0	1	4	22
##	71	5	1	2	1	2	5	3	2	2	1	1	1	1	1	1	1	1	1	1	10	1	0	1	1	1	1	0	1	0	1	7	1	1	0	0	0	0	1	1	1	0	5	22
##	61	4	1	1	1	1	5	2	1	2	1	1	1	1	0	1	1	0	1	0	7	1	1	0	1	1	1	0	1	0	1	7	0	1	0	1	0	1	1	0	1	0	5	19
##	77	5	2	1	4	1	8	5	4	2	1	1	0	1	1	1	1	1	1	1	9	1	1	1	0	1	1	0	1	1	1	8	1	1	1	1	1	1	0	0	1	1	8	25
##	86	5	2	1	3	1	6	4	5	2	1	0	1	1	1	0	0	1	1	0	6	1	1	0	1	1	1	1	1	1	0	8	1	1	1	0	1	0	1	1	0	0	6	20
##																																												
##	61	4	2	1	4	2	2	3	2	2	1	0	1	1	0	1	1	0	1	0	6	1	0	1	0	1	0	1	1	1	1	7	1	1	1	1	1	1	0	1	1	0	8	21
##	64	4	2	1	4	1	1	5	2	2	1	1	1	1	0	1	0	1	1	1	8	1	1	1	1	0	0	1	1	1	0	7	1	0	1	0	0	0	1	1	1	0	5	20

POST TEST SCORES IN CONTROL GROUP

A	B																																											
1	48	3	2	1	4	1	5	5	2	1	1	0	1	0	1	0	1	1	1	0	6	0	1	1	1	0	1	1	1	1	1	8	0	1	1	1	1	1	0	0	1	1	7	14
2	66	5	1	1	4	1	2	3	3	3	1	0	1	0	1	1	1	1	0	0	6	1	1	0	1	1	0	0	0	0	0	4	1	0	1	1	1	1	1	1	1	1	9	10
3	78	5	1	1	4	1	4	6	2	3	0	0	0	0	1	0	1	1	1	0	4	0	0	1	0	1	0	0	0	0	1	3	0	1	0	1	1	1	1	1	0	1	7	10
4	56	4	1	2	4	1	6	2	1	1	1	0	1	1	1	1	1	0	0	0	6	1	0	1	0	1	1	1	1	1	1	8	1	0	1	1	1	1	0	0	1	1	7	14
5	55	3	2	1	4	2	7	5	5	2	0	0	0	1	1	1	1	1	1	0	6	0	1	1	1	1	0	1	0	0	1	6	0	1	0	1	1	1	0	0	0	0	4	11
6																																												
7	62	4	1	2	4	1	1	5	3	2	1	1	1	1	0	1	1	0	0	1	7	0	0	1	1	1	0	1	1	0	1	6	1	1	1	0	1	0	0	0	1	1	6	13
8	82	5	1	3	2	2	4	4	2	3	1	1	1	0	1	1	1	1	1	0	8	1	1	1	1	1	1	0	1	1	1	9	1	1	1	0	1	1	1	0	0	0	6	17
9	51	4	2	1	4	1	4	3	5	1	1	0	0	0	1	1	1	0	1	1	6	0	1	1	1	0	1	1	1	0	1	7	0	1	1	0	0	1	0	1	0	0	4	13
10	56	4	2	1	2	1	4	2	4	2	1	1	1	1	1	1	1	1	1	1	10	0	0	1	1	1	0	1	1	1	0	6	0	0	0	0	0	1	1	1	1	0	4	16
11	76	5	2	1	1	1	4	1	1	3	1	1	1	1	0	1	1	0	0	1	7	1	1	0	0	1	1	1	0	1	0	6	1	1	1	1	1	0	0	0	1	0	6	13
12	83	5	2	1	2	1	2	5	2	3	0	1	1	1	0	1	0	1	1	1	7	1	0	1	1	0	1	0	1	1	0	6	0	1	0	0	0	1	0	0	0	0	2	8
13	57	4	2	1	1	1	4	3	3	1	1	0	1	1	1	1	1	0	1	1	8	1	1	1	0	0	1	1	1	1	1	8	0	1	0	1	1	0	0	0	0	0	3	16
14	78	5	1	2	4	1	5	2	5	2	1	1	0	0	1	1	1	0	0	1	6	0	1	0	1	1	1	1	0	1	0	6	0	1	1	1	0	0	1	0	0	0	4	12
15	69	5	2	1	4	1	6	4	5	2	0	1	1	1	0	1	1	0	1	1	7	0	1	1	1	0	1	0	1	0	1	6	0	1	1	0	1	1	0	0	1	1	6	13
16	64	4	1	1	4	1	2	2	4	2	0	1	1	0	0	1	1	0	1	1	6	1	0	1	0	0	1	1	0	0	1	5	0	0	0	1	0	1	0	0	0	0	2	11
17	72	5	1	2	4	1	4	3	5	3	0	1	1	1	0	1	1	1	0	0	6	0	1	1	1	1	1	0	1	1	0	7	0	1	0	1	0	1	1	1	0	0	5	13
18	49	3	2	1	4	1	3	5	2	1	0	0	1	1	1	1	1	0	1	1	7	0	1	1	1	1	0	1	0	1	1	7	1	0	1	0	1	0	1	0	1	0	5	14
19																																												
20	70	5	2	1	2	2	8	2	2	3	0	1	1	0	1	0	0	1	1	1	6	1	1	0	1	1	1	1	0	1	1	8	1	1	1	0	0	1	1	0	0	0	5	14
21	78	5	1	1	4	1	4	3	5	3	0	0	1	1	1	1	1	0	1	1	7	1	0	1	1	0	1	1	1	0	0	6	1	0	1	0	1	0	0	1	1	1	6	11
22	57	4	2	1	4	1	5	2	4	1	1	1	1	0	1	1	0	1	1	1	8	0	0	0	1	0	1	1	1	0	1	5	0	1	1	1	1	1	1	0	1	0	7	13
23	72	5	1	2	4	1	2	2	1	2	1	1	0	1	1	0	1	1	1	1	8	1	0	0	1	0	1	1	1	1	1	7	1	0	1	0	1	0	1	0	0	1	5	15
24	90	5	2	2	1	1	5	5	2	4	0	0	1	1	0	1	0	0	1	1	5	1	0	0	1	1	1	1	1	1	0	7	1	1	1	1	1	1	0	1	0	1	8	12
25	61	4	2	2	4	1	2	4	5	3	1	0	0	1	1	1	1	1	0	0	6	1	1	0	1	0	1	0	1	1	1	7	0	0	1	0	1	1	1	0	0	0	4	13
26	55	4	1	3	4	1	1	4	2	1	1	0	1	1	1	1	1	0	1	1	8	0	1	0	1	1	1	1	0	0	0	5	1	0	1	0	1	0	1	1	0	1	6	11
27																																												
28	67	5	2	1	3	2	6	2	2	3	0	1	1	1	1	1	1	1	1	0	8	1	1	0	1	1	1	1	0	1	1	8	1	0	0	0	1	1	1	0	0	0	4	16
29	83	5	1	1	2	1	5	3	3	4	1	1	1	1	1	1	1	1	0	1	9	1	1	1	1	1	1	1	1	1	1	10	0	1	1	0	1	1	0	1	1	1	7	19
30	46	3	1	1	3	2	9	1	5	1	1	0	1	0	1	0	0	1	0	1	5	0	0	1	1	1	0	0	1	0	1	5	1	0	0	1	0	0	0	0	0	0	2	10
31	67	5	2	1	3	1	5	2	5	2	1	1	1	1	1	1	0	1	1	1	9	1	0	1	1	1	1	1	1	0	1	8	0	1	0	0	1	0	0	1	0	0	3	17

32	65	5	2	1	3	1	6	5	4	2	1	0	1	0	0	0	1	0	1	0	4	1	1	1	1	0	1	0	1	1	1	8	1	1	0	1	1	1	0	0	0	1	6	12
33	81	5	2	2	3	1	2	4	5	4	1	1	0	1	1	1	0	1	1	0	7	1	1	1	1	1	1	1	1	1	1	10	1	1	1	1	1	1	0	1	0	0	7	10
34	78	5	1	1	1	1	2	2	2	4	1	0	1	1	1	0	1	1	1	1	8	1	1	1	1	0	1	1	1	0	0	7	1	0	1	1	1	0	0	1	0	1	6	15
35	70	5	1	1	4	1	2	3	5	3	1	1	0	1	1	0	0	1	1	0	6	0	1	1	1	1	1	1	1	1	0	8	1	1	1	1	0	0	1	1	0	0	6	14
36	95	5	2	2	4	2	12	2	4	4	0	0	1	1	1	0	1	1	1	0	6	1	0	1	1	1	1	0	0	1	1	7	1	0	0	1	0	1	0	1	0	0	4	12
37	88	5	1	1	4	2	5	5	5	4	1	1	1	0	0	1	1	1	0	1	7	0	1	1	1	1	1	1	1	1	1	9	0	1	0	1	0	1	1	1	1	1	7	16
38	65	5	1	1	4	2	7	4	2	2	1	1	1	0	1	0	1	0	0	0	5	1	1	1	1	1	1	0	1	1	1	9	1	0	1	1	1	0	1	0	1	0	6	14
39	50	3	2	1	3	1	5	2	1	1	0	0	1	1	1	1	0	1	0	0	5	0	1	1	1	0	0	1	1	1	0	6	1	0	1	1	1	0	1	1	1	0	7	11
40	78	5	1	2	3	1	2	3	3	2	1	1	0	1	1	1	1	1	0	1	8	1	1	1	1	1	1	0	0	0	1	7	0	0	0	0	1	0	1	0	0	1	3	15
41	60	4	1	1	4	1	1	5	2	1	1	0	1	0	0	1	0	1	0	1	5	0	0	1	0	1	1	1	0	1	1	6	0	1	1	0	0	0	1	0	1	0	4	13
42																																												
43	77	5	2	1	4	1	4	2	4	4	1	1	1	0	1	1	1	1	1	0	8	0	1	0	1	1	1	0	1	1	1	7	1	1	1	1	0	0	1	0	0	0	5	15
44	82	5	1	1	4	1	5	3	2	3	0	0	1	1	1	0	0	1	1	0	5	1	0	1	1	0	1	1	0	1	0	6	1	0	1	0	11	1	1	1	0	0	16	11
45	55	3	2	1	4	1	2	2	5	1	1	1	1	1	1	0	1	1	0	1	8	0	1	0	1	1	1	1	0	1	1	7	1	1	1	1	0	1	0	1	0	0	6	11
46	50	3	2	1	4	1	4	5	3	1	0	1	1	1	0	1	0	1	1	1	7	1	1	1	0	1	0	1	1	0	1	7	0	1	1	1	1	1	11	1	1	0	18	14
47	75	5	1	1	4	2	6	4	2	3	0	0	1	1	0	1	0	1	1	1	6	0	0	1	1	1	0	1	0	1	1	6	1	1	1	1	1	0	1	1	0	0	7	12
48	72	5	2	2	4	1	1	2	5	2	1	1	0	1	1	1	0	0	1	0	6	1	1	0	1	0	1	0	1	1	1	7	0	1	1	1	0	1	1	0	0	1	6	13
49	88	5	1	1	4	1	4	3	4	3	1	1	1	1	0	1	1	1	0	0	7	0	0	1	1	0	0	1	1	1	1	6	0	0	0	1	1	1	1	0	0	0	4	13
50	59	4	2	1	1	1	2	2	2	2	0	1	0	1	1	0	1	0	1	0	5	1	1	1	0	1	1	0	0	1	0	6	0	0	0	0	0	0	0	1	1	0	2	12
51	80	5	2	2	3	2	9	1	3	3	1	1	1	1	1	1	0	1	1	0	8	0	1	0	0	0	1	1	1	0	1	5	1	1	1	1	0	1	0	1	1	0	7	13
52	71	5	1	3	4	1	4	2	2	3	1	1	0	1	1	0	1	1	1	1	8	1	0	1	0	0	1	1	1	1	0	6	0	0	0	1	1	0	1	0	0	0	3	14
53	55	3	2	1	2	1	4	3	1	1	1	0	1	0	1	0	0	0	1	0	4	0	1	0	1	1	1	1	0	1	2	8	1	1	1	1	1	1	1	0	1	1	9	12
54	67	5	2	2	4	2	6	2	5	3	1	1	0	0	1	1	0	1	1	0	6	0	0	1	1	1	1	0	0	1	0	5	0	0	1	0	1	0	1	0	0	0	3	11
55																																												
56	80	5	2	1	4	1	1	4	2	2	1	1	1	1	1	1	1	1	0	1	9	0	1	1	0	1	0	1	1	1	1	7	0	1	1	0	1	1	0	1	0	0	5	16
57	57	4	2	1	4	1	2	2	3	3	1	1	1	0	1	0	1	1	1	0	7	0	0	1	0	1	1	1	1	1	0	6	1	0	1	1	1	0	1	0	0	0	5	13
58	60	4	1	1	4	1	5	3	2	2	1	0	1	0	1	0	1	1	0	1	6	1	0	1	0	1	0	1	1	0	0	5	1	1	0	1	0	0	0	1	1	1	6	11
59	49	3	2	2	1	1	4	2	1	1	1	0	1	0	1	0	1	1	0	1	6	0	1	1	0	1	1	1	0	1	1	7	1	1	0	0	1	0	0	0	1	0	4	13
60	38	2	1	1	4	1	5	5	4	1	0	1	1	1	1	1	1	1	1	1	9	0	1	0	1	0	0	0	1	0	1	4	0	1	1	1	1	1	1	1	1	1	9	13
61	77	5	2	1	1	1	5	4	5	3	1	1	0	1	1	1	1	0	0	1	7	1	1	1	1	0	0	1	0	1	1	7	0	0	0	1	0	0	0	0	1	0	2	14
62	78	5	2	1	3	1	4	2	2	3	0	1	1	1	0	0	1	1	1	0	6	1	0	0	0	1	0	1	1	1	1	6	1	1	1	0	1	1	1	0	0	0	6	9
63	82	5	1	2	4	1	2	3	3	3	0	1	1	1	1	1	0	1	1	1	8	0	1	1	1	1	1	1	0	0	0	6	1	0	1	0	1	0	0	0	1	0	4	11
64	56	4	2	1	4	1	2	2	2	1	1	1	0	1	0	1	0	1	0	1	6	0	0	1	0	1	1	1	1	1	1	7	1	0	0	1	1	1	0	1	0	1	6	13

65	53	3	1	2	3	2	9	5	1	2	0	1	0	1	1	1	1	0	1	1	7	1	1	0	1	1	0	1	1	1	0	7	1	0	0	0	1	0	1	1	0	0	4	14
66	59	5	2	2	4	1	2	3	4	1	1	0	1	1	1	0	1	1	1	1	8	0	1	0	1	0	0	0	1	0	1	4	1	1	1	0	0	1	1	1	1	0	7	12
67	75	5	1	1	4	1	6	2	5	2	1	1	1	0	1	1	0	1	1	1	8	0	0	1	0	1	1	1	0	0	1	5	0	0	1	1	1	1	1	0	0	0	5	13
68	70	5	2	1	4	1	2	5	2	2	1	1	0	0	1	0	0	0	1	1	5	0	1	1	1	1	1	0	0	1	1	7	1	0	1	0	1	0	0	0	0	0	3	12
69	80	5	1	1	4	2	12	4	3	3	0	0	0	1	1	1	0	0	1	0	4	1	1	0	1	1	0	0	1	1	1	7	0	1	0	1	1	0	0	0	1	0	4	12
70	68	5	1	1	4	2	4	4	2	2	1	1	1	1	0	1	1	1	0	0	7	0	1	0	1	0	1	0	1	1	1	6	1	0	1	0	1	0	1	1	0	0	5	13
71	59	4	1	1	4	1	2	4	5	1	0	0	1	1	1	1	1	1	1	0	7	1	1	1	1	0	1	1	0	0	1	7	1	1	0	1	1	1	0	0	0	0	5	12
72	77	5	2	1	4	1	5	4	4	3	1	0	0	0	1	1	1	0	1	0	5	1	0	0	1	1	0	1	1	1	1	7	1	1	1	0	1	1	1	1	1	1	9	15
73	83	5	2	2	2	1	4	4	2	3	1	1	0	1	1	1	1	0	1	1	8	1	0	1	1	0	1	1	0	1	1	7	1	0	1	1	1	1	1	1	0	1	8	15
74	67	5	2	1	3	1	2	2	1	2	1	0	1	1	1	1	0	1	1	1	8	1	1	1	0	1	1	1	1	1	1	9	1	0	1	1	1	0	0	1	1	1	7	17
75	59	4	2	3	3	2	9	5	3	1	1	1	1	1	0	1	1	1	0	1	8	1	0	1	0	1	1	0	0	1	1	6	1	1	1	1	1	1	0	1	1	1	9	14
76	58	4	1	1	1	1	2	5	3	1	1	1	1	1	1	0	1	1	0	1	8	0	1	1	0	0	0	1	1	1	1	6	1	0	1	0	1	1	1	0	1	0	6	15
77	84	5	2	1	2	1	2	2	2	3	1	1	0	0	0	1	1	1	0	1	6	0	1	1	0	0	1	1	0	1	0	5	1	1	0	1	1	1	0	1	1	0	7	11
78	70	5	2	1	4	1	4	3	5	3	1	1	1	1	1	0	1	1	1	0	8	1	0	1	0	0	0	1	1	1	1	6	1	0	1	0	1	1	1	1	1	0	7	14
79	59	4	2	1	4	1	2	2	4	1	1	0	0	0	0	1	0	1	1	1	5	1	1	0	1	0	1	1	1	1	0	7	0	1	0	1	0	0	0	1	0	1	4	12
80																																												
81	70	5	2	2	4	2	8	4	1	2	0	1	0	1	0	1	1	1	0	1	6	1	0	0	1	1	0	1	0	1	1	6	0	0	1	1	1	0	0	1	1	0	5	12
82	68	5	1	3	4	1	2	2	3	1	1	1	0	1	0	1	1	1	0	0	6	1	1	0	1	1	1	0	1	1	1	8	0	1	1	1	0	0	1	1	0	0	5	14
83	57	4	2	1	4	1	4	2	2	1	1	1	1	1	1	1	1	1	1	0	9	0	1	0	1	0	1	0	1	1	1	6	0	1	1	0	1	0	1	1	0	1	6	13
84	88	5	2	1	4	1	2	2	5	3	1	1	1	1	1	1	0	0	1	0	7	1	1	0	1	1	1	1	0	0	1	7	1	1	0	1	1	1	1	1	0	0	7	14
85	67	5	1	2	1	2	5	3	4	2	1	1	0	1	1	1	1	1	1	0	8	1	1	0	1	0	1	0	1	1	0	6	1	1	1	1	0	1	1	0	1	0	7	14
86	74	5	2	1	4	1	1	2	2	3	1	0	1	1	1	0	1	1	1	0	7	1	1	1	0	1	0	1	0	0	1	6	0	1	0	1	0	1	1	1	0	1	6	15
87	60	4	2	1	3	1	2	5	1	1	0	1	1	1	1	0	1	1	1	0	7	1	1	0	1	0	1	1	0	1	0	6	1	0	0	0	1	1	1	1	1	0	6	13
88	66	5	2	1	1	1	1	3	3	2	1	1	1	1	0	1	0	1	1	1	8	1	0	1	0	0	1	0	1	0	1	5	0	1	0	1	1	0	1	1	0	1	6	13
89	88	5	1	1	3	2	15	2	2	3	1	1	1	1	1	1	0	1	1	1	9	0	0	1	0	1	0	1	1	0	1	5	1	1	1	0	1	0	1	1	1	0	7	14
90	56	4	2	1	4	1	5	4	5	2	1	1	1	1	1	0	0	0	1	0	6	1	0	0	1	0	1	0	0	1	0	4	1	0	1	0	0	1	0	1	0	0	4	10
91	53	3	2	1	4	1	4	5	4	1	1	1	1	1	1	1	1	1	0	1	9	1	0	1	0	1	1	1	1	0	0	6	1	1	1	1	0	0	1	1	1	1	8	15
92	83	5	1	2	1	1	5	2	2	3	1	0	0	1	1	1	1	0	0	1	6	0	0	1	1	0	1	0	1	0	1	5	1	1	1	1	1	1	0	1	1	1	9	11
93	77	5	2	2	4	1	6	3	1	3	1	1	1	1	1	1	1	1	0	1	9	1	1	1	0	0	1	0	1	1	0	6	1	1	1	0	1	0	1	0	1	0	6	15
94	58	4	2	1	3	1	2	2	3	1	1	0	0	1	0	1	1	0	0	1	5	0	1	0	1	1	0	0	1	0	0	4	1	1	1	1	0	1	0	0	1	1	7	13
95																																												
96	85	5	2	2	4	1	1	4	5	2	1	1	1	1	0	1	1	1	1	0	8	0	1	1	0	1	0	0	1	1	0	5	1	1	1	0	1	0	1	1	0	1	7	13
97	55	3	1	3	1	2	5	2	4	1	1	0	0	0	1	1	1	1	1	0	6	1	1	0	0	1	0	1	0	0	0	4	1	1	1	1	0	1	1	0	1	0	7	13

98	47	3	1	1	2	1	4	1	2	1	1	1	0	0	1	1	0	1	1	1	7	0	1	1	0	1	1	0	1	0	1	6	0	1	1	0	1	1	1	1	1	1	8	13
99	64	4	2	1	2	1	5	3	3	3	1	1	1	0	0	1	1	1	0	1	7	0	0	1	0	1	0	1	0	1	1	5	0	1	0	1	0	1	0	1	0	1	5	12
##	73	5	1	1	4	1	4	5	2	2	1	1	1	0	0	0	1	0	1	1	6	1	1	1	0	1	1	1	1	1	1	9	0	0	0	1	0	1	0	1	1	1	5	15
##	82	5	2	1	4	1	5	2	5	3	0	1	1	1	1	0	1	1	0	1	7	1	0	0	0	1	0	0	1	0	1	4	0	0	0	0	1	0	1	0	0	0	2	15
##	90	5	1	2	4	2	8	3	4	4	0	1	1	1	0	0	1	1	0	1	6	0	1	0	1	0	0	0	1	1	0	4	1	1	0	1	0	1	1	1	1	1	8	15
##																																												
##	58	4	2	1	3	1	4	5	5	1	0	1	1	1	0	1	1	0	0	0	5	1	0	0	0	1	0	1	0	0	1	4	0	1	0	0	1	1	0	1	0	0	4	9
##	49	3	2	1	2	1	5	5	2	1	1	1	0	1	1	0	1	0	1	1	7	1	0	0	0	1	1	0	0	0	0	3	0	1	0	0	0	0	1	0	1	0	3	11
##	70	5	2	1	4	2	6	3	3	2	1	1	1	1	1	0	0	1	0	0	6	1	1	0	1	0	1	0	1	0	1	6	1	0	0	1	0	1	1	0	0	0	4	12
##	84	5	1	1	4	1	4	2	2	3	1	0	0	0	0	1	1	1	1	0	5	0	1	0	1	0	1	0	1	0	0	4	0	1	1	1	1	0	1	1	1	1	8	9
##	55	3	2	1	4	1	2	3	5	1	0	1	1	0	1	1	1	0	1	1	7	1	0	1	1	1	0	1	1	0	0	6	0	1	0	1	0	1	1	1	1	1	7	13
##	65	5	1	1	4	1	5	3	4	2	1	0	1	1	1	1	0	1	0	1	7	0	1	1	0	1	0	1	0	1	0	5	0	0	1	0	0	1	1	1	1	1	6	13
##	77	5	2	1	4	1	5	2	5	3	1	1	1	0	1	1	1	0	1	1	8	1	1	1	1	1	0	1	1	0	1	8	0	1	0	1	0	1	1	0	0	0	4	16

ANNEXURE IV – KEY TO MASTER CHART

General Information

A. Serial Number

B. Age (in completed years)

C. Age Groups:

1. 25 to 35 years
2. 36 to 45 years
3. 46 to 55 years
4. 56 to 65 years
5. More than 65 years

D. Sex

1. Male
2. Female

E. Religion

1. Hindu
2. Muslim
3. Other

F. Category (Caste)

1. SC
2. ST

3. OBC
4. Others

G. Type of family

1. Nuclear
2. Joint
3. Extended
4. Broken

H. Family size: In number of members in the family

I. Education

1. Illiterate
2. 1st to 5th standard
3. 6th to 10th standard
4. 11 – 12th standard/Diploma
5. Graduation

J. Socio-economic status. (According to Modified B. G. Prasad's classification)

1. Class I
2. Class II
3. Class III

4. Class IV
5. Class V

K. Duration with Diabetes

1. < 5 years
2. 5 to 10 years
3. 10 to 15 years
4. >15 years

Knowledge, Attitude and Self-care practices in Diabetes

L. Diabetes is due to?

1. Correct Answer
0. Wrong Answer

M. How many types of diabetes?

1. Correct Answer
0. Wrong Answer

N. What is cut off point for high blood sugar?

1. Correct Answer
0. Wrong Answer

O. What are the signs and symptoms of high blood sugar?

1. Correct Answer

0. Wrong Answer

P. What is the cut off point for low blood sugar?

1. Correct Answer

0. Wrong Answer

Q. What are the signs and symptoms of low blood sugar

1. Correct Answer

0. Wrong Answer

R. What should be the normal random blood sugar?

1. Correct Answer

0. Wrong Answer

S. What are the causes of increased blood sugar in diabetes?

1. Correct Answer

0. Wrong Answer

T. What are the causes of decreased blood sugar in diabetes?

1. Correct Answer

0. Wrong Answer

U. What are the investigations to be done in diabetes?

1. Correct Answer

0. Wrong Answer

V. What are the complications of diabetes?

1. Correct Answer

0. Wrong Answer

W. How often should you check your eyes in diabetes?

1. Correct Answer

0. Wrong Answer

X. How should a diabetic patient take his meals?

1. Correct Answer

0. Wrong Answer

Y. How does diet help in controlling diabetes?

1. Correct Answer

0. Wrong Answer

Z. What type of foods is encouraged in diabetes?

1. Correct Answer

0. Wrong Answer

AA. What type of foods are discouraged in diabetes

1. Correct Answer

0. Wrong Answer

AB. How does regular exercise help to control diabetes?

2. Correct Answer

0. Wrong Answer

AC. What is the best daily exercise advised in diabetes?

3. Correct Answer

0. Wrong Answer

AD. Do you know of any tablets for control of diabetes?

1. Correct Answer

0. Wrong Answer

AE. What are the precautions to be taken with tablets?

1. Correct Answer

0. Wrong Answer

AF. What are the important sick day rules you know?

1. Correct Answer

0. Wrong Answer

AG. Diabetes management includes balancing?

1. Correct Answer
0. Wrong Answer

AH. When should you go to your family doctor?

1. Correct Answer
0. Wrong Answer

AI. Is Diabetes a curable or controllable disease?

1. Correct Answer
0. Wrong Answer

AJ. What is the immediate treatment of high blood sugar?

1. Correct Answer
0. Wrong Answer

AK. What is the immediate treatment of low blood sugar?

1. Correct Answer
0. Wrong Answer

AL. How is skin care given in Diabetes?

1. Correct Answer
0. Wrong Answer

AM. How is foot care done in Diabetes?

1. Correct Answer

0. Wrong Answer

AN. How do you care for Diabetic foot ulcer?

1. Correct Answer

0. Wrong Answer

AO. How is insulin given?

1. Correct Answer

0. Wrong Answer

AP. Total Knowledge Score

AQ. Total Attitude score

AR. Total Behavior score

AS. Total score