Master of Science in Public Health

Effect of Nutritional Education on the knowledge of Diabetic patients using the Health Belief Model in Rawalpindi city: Quasi Experimental Study

By

(Rabbia yousaf)

Al-Shifa School of Public Health, PIO,
Al-Shifa Trust Eye Hospital
Quaid-I-Azam University
Islamabad, Pakistan
(2022)

Effect of Nutritional Education on the knowledge of Diabetic patients using the Health Belief Model in Rawalpindi city: Quasi Experimental Study

(RABBIA YOUSAF)

(362820-PIO/MSPH-2020)

Dissertation submitted in partial fulfillment of the requirement for the degree of:

MASTER OF SCIENCE IN PUBLIC HEALTH (2022)

To

Al-Shifa School of Public Health, PIO, Al Shifa Trust Eye Hospital, Faculty of Medicine Quaid-I-Azam University, Islamabad.

Word Count: 12,100

Declaration

In submitting this dissertation, I certify that I have read and understood the rules and regulations of DPH and QAU regarding assessment procedures and offences and formally declare that all work contained within this document is my own apart from properly referenced quotations.

I understand that plagiarism is the use or presentation of any work by others, whether published or not, and can include the work of other candidates. I also understand that any quotation from the published or unpublished works of other persons, including other candidates, must be clearly identified as such by being placed inside quotation marks and a full reference to their source must be provided in proper form.

This dissertation is the result of an independent investigation. Where my work is indebted to others, I have made acknowledgments.

I declare that this work has not been accepted in substance for any other degree, nor is it currently being submitted in candidature for any other degree.

_____   _____

(Dr. Ayesha Babar Kawish)   **(Rabbia yousaf)**
Head of Department   (362820-PIO/MSPH-2020)
Al-Shifa School of Public Health,   MSPH (2022)
PIO, Al Shifa Trust Eye Hospital   Date: 22-09-2022
Date: 22-09-2022

Dedicated to my mother and all those who have been a constant source of support and encouragement for me in my research work

I couldn't be able to accomplish this task without your support…….

ABSTRACT

Background: Diabetes is the most prevalent disease worldwide, resulted from metabolic disorders. In the past two decades, Pakistan suffered from several public health issues among them one of the most concern issue is increasing prevalence of diabetes mellitus.

Objectives: To determine the effectiveness of Health Belief Model on nutrition education in diabetic patients in Rawalpindi city. To assess the awareness about effects of diet in control of diabetes mellitus

Methodology: In this study quasi-experimental design used for collecting data from type 2 diabetic patients who visited the OPD above 30 years, from tertiary hospital of Rawalpindi city. The study duration is six month. Data was collected from 53 diabetic patients using non-probability purposive sampling. The intervention was consisted of one educational sessions each one 20 minutes. Data were collected by validated and reliable (DRNK-Q 46 questions). After the intervention the data were analyzed through SPSS version 21 with results being significant at $P > 0.05$, Paired t-Test was used to assess nutritional knowledge and Health belief model components.

Results: Out of the total, $28 \pm 52.8\%$ (N=53) were females and rest are males majority of respondents are of less than $51\text{-}64 \pm 34.0$ years of age. Result of paired sample t-test nutritional knowledge of diabetic patient before and after intervention 10.83 ± 32.91 and behaviors changes by using Health belief model result before and after intervention 8.65 ± 12.73

Conclusion: Our results suggest that educating patients with diabetes based on HBM promotes the nutritional knowledge, improvement in self-care and change dietary habits of diabetic patients.

Keywords: Type 2 Diabetes Mellitus, Nutritional Knowledge, Health Belief Model, Nutritional Education, Hyperglycemia, and Self-Care.

ACKNOWLEDGEMENTS

TABLE OF CONTENT

CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBEREVAITIONS

SPSS	Statistical package for social sciences
WHO	World health organization
PNNS	Pakistan national nutritional survey
DM	Diabetes mellitus
T1DM	Type 1 Diabetes mellitus
T2DM	Type 2 Diabetes mellitus
ADA	American diabetes association
IDF	International diabetes federation
IRB	Institutional review board
SD	Standard deviation
PH	Public health
DRNK-Q	Diabetes Related nutrition knowledge
MNT	Medical nutritional therapy
FDA	Food and drug administration
DSHEA	Dietary supplement health and education act

CHAPTER I: INTRODUCTION

Diabetes mellitus also known as 'diabetes' it was derived from Greek word 'Diabetes' means 'siphon - to pass through' and Mellitus is a Latin word means "Sweet". Diabetes is a metabolic diseases and it is a multi-factorial disorder that is characterized by a chronic rise in the blood sugar level. (Kumari, et al., 2022)

The main broad categories are Type 1 Diabetes Mellitus (T1DM) and Type 2 Diabetes Mellitus (T2DM), which occur because of defective insulin secretion (T1DM) and/ or action (T2DM). T1DM occur in children or adolescents, while T2DM affect middle-aged and older adults who have prolonged hyperglycemia due to poor lifestyle and dietary choices. (Sonika, et al., 2022)

Diabetes is a clustering of common metabolic disorders resulting in hyperglycemia. (Kotsis, et al., 2018) The chronic hyperglycemia of diabetes is associated with long-term damage, dysfunction and failure of different organs, especially the eyes, kidneys, nerves, heart, and blood vessels (ADA, 2018). Diabetes is a chronic and non-communicable disease and increasing day by day in whole world and affecting the people of all age groups. King at el estimated that in 1995, worldwide prevalence of diabetes in adults was 4.0% and it was projected this number will increase to 5.4% by the year 2025 (king H et al, 1998).

In the USA, diabetes mellitus is the major cause of end-stage renal disease, non-traumatic amputation in lower limps and adult blinding. It is expected that diabetes remain the most common cause of death in the coming decades. (Grassi, et al., 2018) Diabetes accounts for 9% of all deaths worldwide. (Nazir, M. A., et al., 2018) According to a community-based study 10.8% of the population in the older onset diabetes group had low vision and 2.7% had legal

blindness. (Cui, Y., at al., 2017) Cardiovascular diseases are responsible for 75% of death among diabetic patients in industrial countries and 50% of patients with diabetes have retinopathy. (Chawla, A., at al., 2016) In addition, the risk of heart attack and stroke and death from cardiovascular diseases is two to four times greater than other patients in patients with diabetes. (Einarson, T. R., at al., 2018) Patients having uncontrolled diabetes have oral complications such as increased dry mouth, burning mouth and periodontal diseases. (Verhulst, M. J., at al., 2019).

The successful control of diabetes is dependent upon the patient's self-care because more than 95 % of care associated with diabetes is observed by the patients themselves. (Shabibi, at al., 2017) Self-care is learned, based on the ability of individuals to perform caring practices on their own; (Zavareh, at al., 2017) it can be defined as a strategy to cope with life affairs that promote health and independence, including special activities to alleviate the symptoms of the disease. (Babazadeh, T., at al., 2017) This process is composed of having a healthy nutrition; on-time medication use, blood glucose or urine self-testing, regular exercises, and foot care. (Firooz, M., at al., 2016) Health practitioners encourage patients with diabetes to develop many self-care behaviors. (Sayehmiri, K., at al., 2017). Thus, the purpose of the nutritional education is for the disease to be managed by the patient and to improve the patients' quality of life. (Dehghani-Tafti, at al., 2015)

To promote sound health good nutrition is essential. It works together with physical activity and helps one lead a sound and healthy life, keeping most of the chronic diseases aside (Carr & Descheemaeker, 2019)   Diet is a key factor in controlling diabetes. Diet therapy is a necessary component of the treatment and may result in lower costs of the disease. (Skamagas, M., at al., 2008). Since the patients have a major role in the control and treatment of type2

diabetes it is important to provide them nutritional education and diet therapy. 9Newton, C. A., & Raskin, at al., 2004)

The importance of education depends upon its behavioral impact. Health Belief Model is recommended for nutrition education to increase the impact of educational programs. (Sharifirad, & Azadbakht, at al., 2009) A major feature of this model holds that the patients have choices and are able to make suitable decisions regarding their health. This model suggests that whether or not individuals take action to protect their health depends on whether they believe that they are susceptible to an ill health condition; that the occurrence of that condition would have serious consequences; and that they have a course of action to avoid the condition and benefits of taking the action compensate the costs. (Bayat, F & Hosseini, M. at al., 2013)

Experts expect the prevalence of DM to increase from 415 to 642 million by 2040, with the most significant increase in populations transitioning from low to middle-income levels. (Zheng, Y & Hu, F. B at al., 2018) More than 90% of people with diabetes are individuals with a form of type 2 diabetes. (Rastegarimehr, B., & Mansourian at al., 2017) More than 60% of the world's diabetic population resides in Asian countries. (Hussain, A. at al., 2018).

So, patients with diabetes need to properly understand the risk of diabetic complications due to lack of nutritional knowledge and Diabetes is one of such diseases in which patients have a major role in its control and it is not possible to have the patients under the supervision of healthcare professionals at all hours of the day, it is necessary to teach these patients in terms of nutritional education to change eating habits.

Rationale:

The serious spread of Diabetes Mellitus is crippling the Nation's fiscal and human resources, therefore it is the time to act now and do as much as possible to cover almost all aspects of the disease. Health of an individual depends on multiple factors and one of the key factors is food. The type and amount of food they eat will determine their future and present health. Few literature found on effectiveness of nutritional education on the knowledge of diabetic patients in Pakistan by using HBM, this study was conducted to examine the effect of Health Belief Model on the self behavior of patients with type 2 diabetes.

➢ In Pakistan, mostly studies focus on prevalence and risk factors of diabetes.

➢ In this study food choices are shaped by the nutritional knowledge of diabetic patients

➢ The findings of the current study eventually help for the development of patient friendly public health interventions in future for managing diabetes complication.

Objectives:

1. To determine the effectiveness of Health Belief Model on nutrition education in diabetic patients in Rawalpindi & Islamabad city.
2. To assess the awareness about effects of diet in control of diabetes mellitus.

CHAPTER II: LITERATURE REVIEW

This chapter summarizes literature present on effects of nutritional education on the knowledge of diabetic patients.

2.1 Background of context:

Diabetes is a non-communicable disease it is preventable and curable. Peoples can prevent diabetes through nutritional knowledge. Knowledge plays an important role to reduce the burden of disease. But it is important to know that to what extent people are aware of diabetes related nutritional knowledge and nutritional practices by using HBM.

Most of the studies were conducted on diabetes risk factors and complication awareness but few work done related to effects of nutritional education on diabetic patient overall health. The prevalence of diabetes mellitus has increased substantially and has reached 8.3% in 2014 which corresponds to 387 million patients globally.

This overall increment leads to the growth in the number of individuals with diabetic complications including peripheral arterial disease, peripheral neuropathy, and lower extremity amputation (Narres et al., 2017)

Diabetes mellitus is considered as one of the most challenging public health concerns, as globally 422 million adults were living with diabetes in 2014, compared to 108 million in 1980. (Solan et al.,2017) The prevalence of diabetes is growing globally due to aging factor, physical inactivity, overweight, urbanization, sedentary lifestyle, neglected self-care routine and poor eating habits.
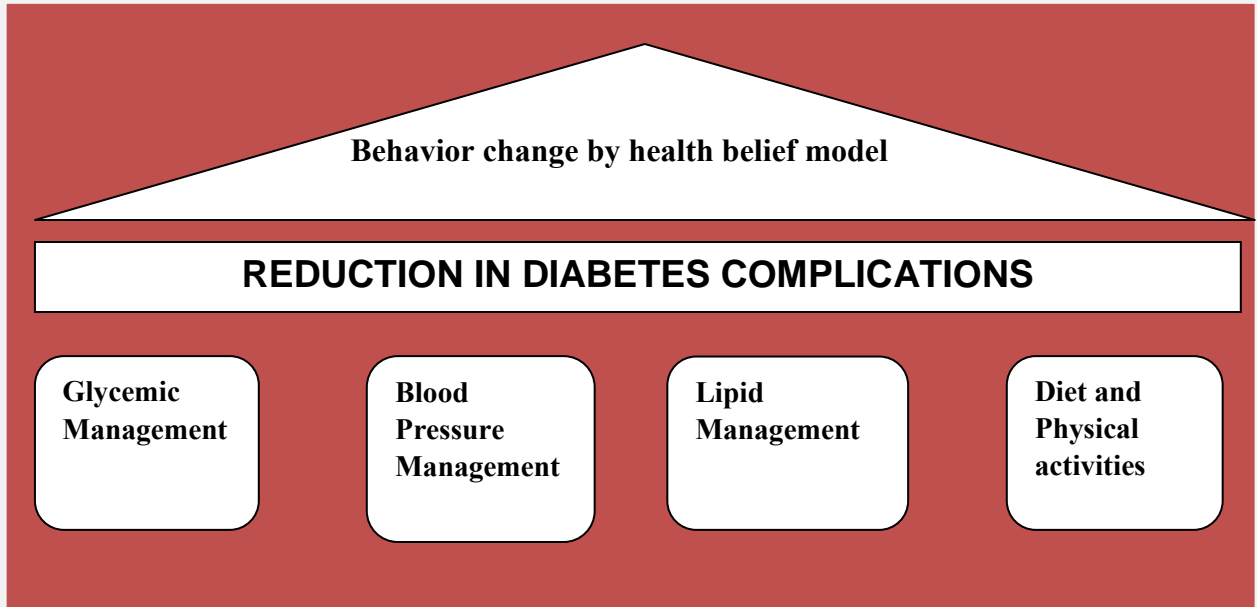
Figure No 1: Multifactorial approach to reduction in risk diabetes complications

2.2 Role of poor lifestyle and diet:

According to the WHO poor lifestyle and dietary factors are the cause of about 80 percent of chronic disease (Ul Haq et al., 2018). Nutrition knowledge refers to knowledge of concepts and processes related to nutrition and health including knowledge of diet and health, diet and diseases, diet and physical activities, foods representing major sources of nutrients, and dietary guidelines (Miller & cassady, 2015). In addition, understanding the norms of community about foods, which are preferred and which are culturally left, can help in building effective eating habits (Ul Haq et al., 2018).

In order to overcome public health issue focus of the study is on knowledge and self-care skills, encouraging patients to take an active role in shaping managing their treatment protocols and prevent from quality of life issues. For diabetes, self management education and

knowledge interventions have been shown to be effective in improving glycemic control and improving quality of life. (Adarmouch et al., 2019)

```
                                              ┌──────────────┐
                                              │     Age      │
                              ┌────────────┐  └──────────────┘
                              │ High blood │
                              │  pressure  │  ┌──────────────┐
                              └────────────┘  │  Sedentary   │
              ┌────────────┐                  │  lifestyle   │
              │Causes of Type                 └──────────────┘
              │ 2 Diabetes │
              └────────────┘                  ┌──────────────┐
                                              │  Unhealthy   │
                              ┌────────────┐  │ food intake  │
                              │ Pancreatic │  └──────────────┘
                              │  disease   │
                              └────────────┘  ┌──────────────┐
                                              │    Stress    │
                                              └──────────────┘

                                              ┌──────────────┐
                                              │   Obesity    │
                                              └──────────────┘
```
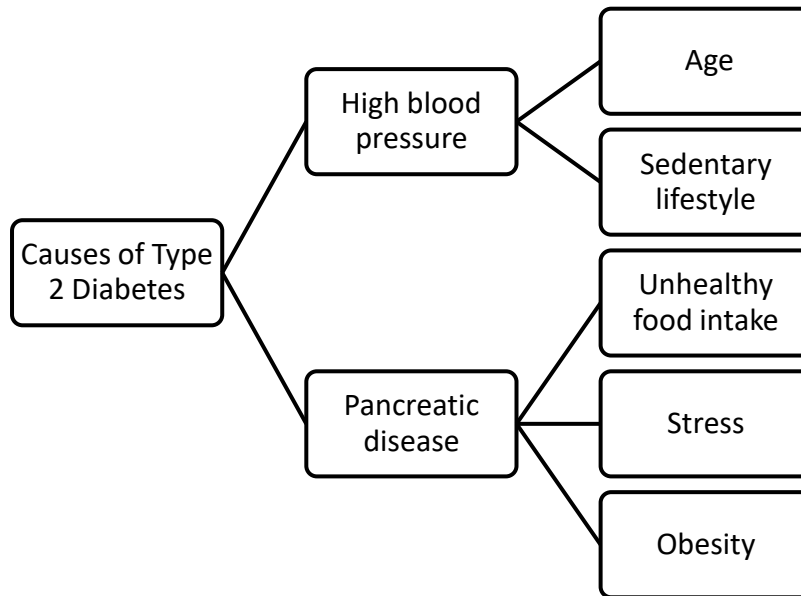
Figure No 2: Main causes of type 2 Diabetes mellitus

Type 2 diabetes has a direct negative effect on an individual's life and imposes an economic burden on society as a whole. This involves the inclusion of costs outside the healthcare sector, such as productivity losses and informal care. The transition from a traditional to modern lifestyle and consumption of diet rich in fat and calories combined with a high level of mental stress has compounded the problem further. The "fast food culture" and "sedentarinism" are the main drivers of diabetes epidemic.

2.3 Nutritional education:

Dietary behaviors of the individual, community and society are directly impacted by the level of nutritional knowledge they have, which also has a role to play in determining their nutritional status.

7

Nutritional knowledge is mainly classified into two type i.e. declarative knowledge and procedural knowledge. Declarative knowledge deals with consciousness of things and processes, whereas procedural knowledge deals with how to do a certain thing. Nutritional knowledge is mainly considered as declarative knowledge.

Health promotion strategies for audiences will only work if their current knowledge is taken into account but it is difficult to set limitations to knowledge, because they are plenty of nutrition information available to diabetic patients and they didn't know what information to consider as reliable. Therefore, having appropriate nutrition knowledge can lead to healthy eating patterns and therefore good health (Trabucco, Nikoic, & Mirkovic, 2013).

Higher nutrition knowledge can lead to making more rationale food choices. For instance, (Miller & Cassady, 2015) reported that people having a prior knowledge on nutrition are more inclined to use food labels and healthy choices.

Correct practice of diet intake is essential for reducing the incidence of diabetes mellitus. Self-care practice is usually provided by the people living with diabetes, themselves, or their families. It takes their own motivation to eat, exercise, stop smoking, take medication, test glucose levels and maintain a healthy body weight making blood sugar management entirely achieved by them.

Prevalence of diabetes in urban and rural areas was 28.3% and 25.3% due to poor nutritional knowledge about dietary intake respectively. Age greater than or equal to 43 years, family history of diabetes, hypertension, obesity and dyslipidemia were significant associated risk and complications for diabetes. (Basit et al., 2018)
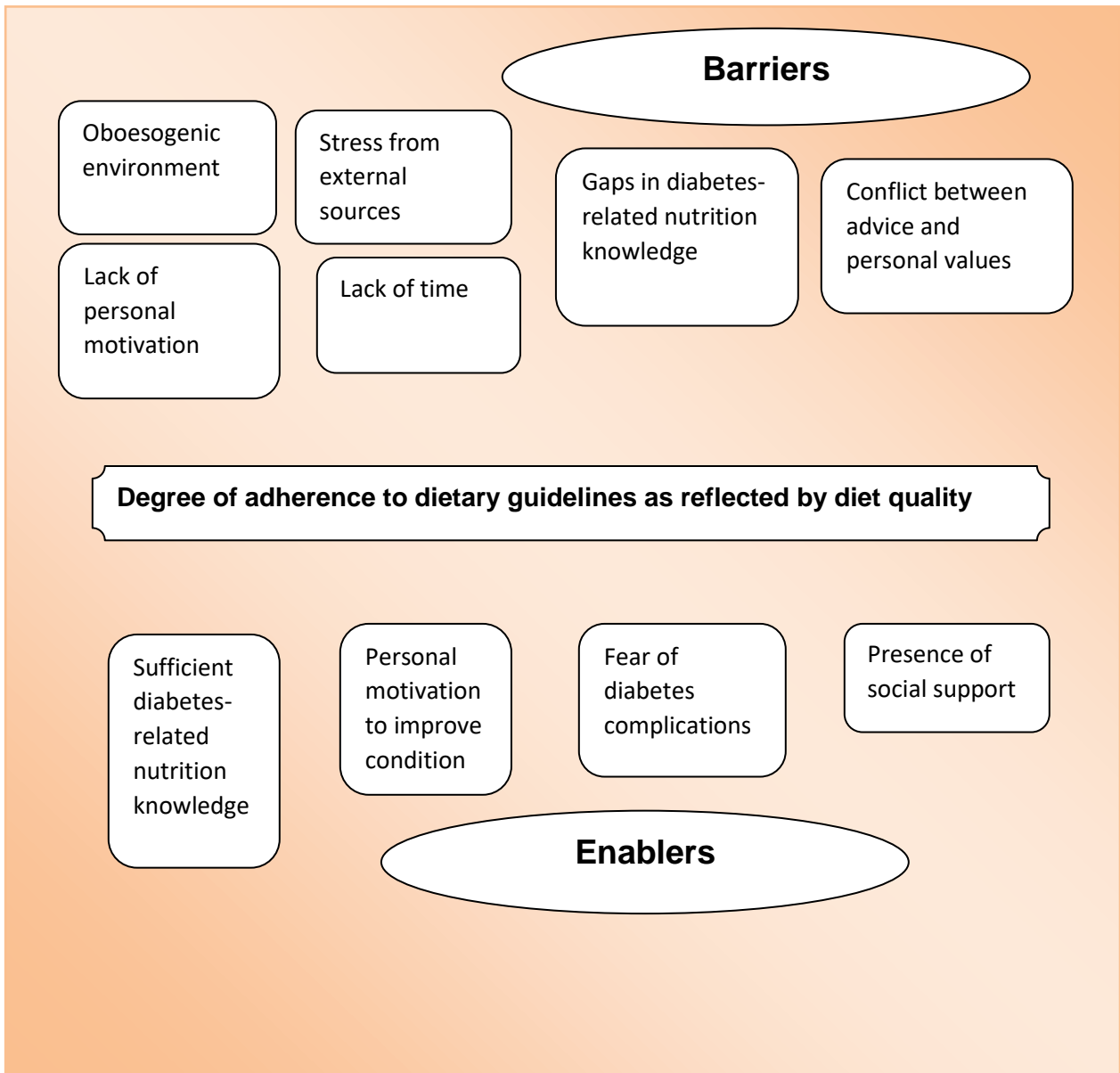
Figure No 3: Diabetes-related nutrition knowledge, barrier and enablers to adherence to dietary guidelines patients with type 2 diabetes

2.4 Global burden of disease:

Diabetes Mellitus (DM) is now becoming a major cause of morbidity and mortality throughout the world. According to IDF, approximately 5.1 million people of age range 30-79 died due to diabetes in recent years.

IDF REGION	2020 MILLION	2035 MILLION	Increase %
Africa	**19.8**	**41.4**	**109**
Middle East and north Africa	**34.6**	**67.9**	**96**
South East Asia	**72.1**	**123**	**71**
South and central America	**24.1**	**38.5**	**60**
Western Pacific	**138.2**	**201.8**	**46**
Europe	**56.3**	**68.9**	**22**
WORLD	**381.8**	**591.9**	**55%**

This table shows that prevalence is high in Western Pacific region and low prevalence is African region. By 2035, it is projected that prevalence will be increased to 109% in African region, which is very serious.

Diabetes is becoming a major public health problem in Pakistan; it is increasing day by day. WHO ranked Pakistan 7th in diabetes prevalence (Faisalabad 2013), Approximately 6.9 million people are diabetic in Pakistan. It is estimated this number will go up to approximately 11.5 million by 2025 unless some precautionary measure are taken to control the disease (Karachi, 2015).

2.5 Diabetes at national Level:

Pakistan is a developing country and facing a sharp growth in the prevalence of diabetes. Although, several research studies have been performed to investigate the prevalence of diabetes and its associated risk factors, but estimates of the prevalence of diabetes vary widely from study to study. Statistically, the prevalence of diabetes in Pakistan is high; ranging from

7.6% (5.2 million populations) to 11% in 2011, it is estimated to reach 15% (14 million) by 2030. This place Pakistan at number 7 in the list of countries with a prevalence of DM, and if the present situation continues, is expected to move to 4th place. This concerning position presents a challenge for health care professionals and health care policy makers in Pakistan.

2.6 Similar research at international and national level:

A study carried out in Iran by (Gholamreza Sharifirad, Mohammad Hasan Entezari, Aziz Kamran, and Leila Azadbakh) on effectiveness of nutritional education on the knowledge of diabetic patients using the health belief model. Eighty eight type 2 diabetic patients attending Iranian Diabetes Association seminars were randomly selected to participate in the study (44 in intervention group and 44 in control group). The intervention was consisted of two educational sessions each one for 80 minutes. After intervention, knowledge scores increased in the intervention group compared to the control group (Mean differences in the intervention and test group: 22.68 ± 15.90 vs $- 2.27 \pm 17.30$, $P < 0.001$).In the intervention group, behavior grades increased more than control group (34.61 ± 14.93 vs -0.23 ± 8.52, $P < 0.001$).The efficacy of the health belief model in nutritional education to the diabetic patients was confirmed in the present study.

In Feb 2021, Luck now city, India similar study conducted by (Ankita Singh, Ajeet Singh Niranjan, Arpit Singh, Sadhana Meena, Smiriti Sia). The study was to investigate the effectiveness of health belief model (HBM) on promoting self care behavior in patients having type II diabetes mellitus. The sample of 200 patients was selected by single blinded randomized controlled trial, 200 patients were involved in the study and they are assigned into 2 groups by using stratified randomization i.e. control (N = 100) and intervention (N = 100). Data collection tool based on Health Belief Model and self care behavior and it was completed

by both groups before the intervention. After that the intervention group received 4 sessions of educational program based on HBM in one month at 7 days interval, and the same questionnaire was again completed by them after 2 months of intervention. The scores of intervention and control groups before the educational intervention was lower in both the groups but after the educational intervention the mean score of each HBM construct and the self-care behaviors showed a significantly increase in intervention group. In this study results suggest that educating patients with diabetes based on HBM promotes the self-care behaviors.

In 2013, study was conducted in rural area of Sudan. This study was conducted on 3316 adults. (Balla SA et al) reported in this article that adults had adequate knowledge almost 15% about diabetes.

In 2020, another exploratory study conducted in Singapore on diabetes-related nutrition knowledge and dietary adherence in patients with Type 2 diabetes mellitus checked by a mixed-method. Forty-two participants were recruited from a tertiary hospital. DRNK and diet quality were ascertained with the DRNK questionnaire and Alternate Healthy Eating Index 2010, respectively. Twenty-one semi-structured interviews of perceived barriers and enablers to adherence to dietary guidelines were audio recorded, transcribed and analyze. Participants had a poor mean percentage DRNK score of 39.7% (±17.7) and diet quality of 54.2% (±9.4). Pearson's correlation tests revealed no correlation between DRNK and diet quality (r –0.29; p=0.065) but suggest a moderate positive correlation between DRNK and psychosocial self-efficacy (r 0.41; p=0.008). DRNK may not correlate with adherence to dietary guidelines; multiple mediating factors are identified when translating DRNK to practice.

In Gondar city of Ethiopia from February- March 2019, a study conducted this study aimed at assessing the use of the health belief model to describe self-care practices among patients with

diabetes. Patients with diabetes require continuous self-care choices and management to minimize the short- and long-term impact of the disease. An institutional-based cross-sectional study was conducted in which total of 396 diabetics patients were selected using a systematic random sampling technique. The collected data were analyzed using STATA 14.The result of this study revealed that Health belief model described 48% of the variance in self-care practices of patients with diabetes. More than half (55.6%) of diabetic patients had good self-care practice. Of the participants, 45.8% and 49.9% had low perceived susceptibility and perceived severity, respectively. The strongest correlation was found between cues to action and perceived severity of health belief model constructs (P<0.001). Self-care practice of diabetes patients in Gondar city was considerably low. Health professionals need to strengthen delivering tailored health messages on the benefit self-care practices and means of overcoming the potential barriers. Health communication programs are also better to consider for individuals with co-morbidities, lack of social support, and lower education.

2.7 Health belief model used for nutritional education:

An understanding of the level of public awareness is helpful for health educators to plan for future nutrition education program. However, a literature search retrieved very few article on the level of diabetes nutritional knowledge and nutritional practices in the general population by using HBM. The components of this model are perceived as susceptibility, severity, benefits, barriers and self-efficacy. Moreover, this model is more suitable than other models for nutrition education. Some researchers also mentioned the beneficiary of applying this model in different health education programs. This study was conducted to determine the effectiveness of nutrition education on the knowledge of diabetic patients using health belief

model. Efforts in this area were directed towards measuring effects of nutritional education on the knowledge of diabetic patients and changing diet patterns and lifestyle changes.
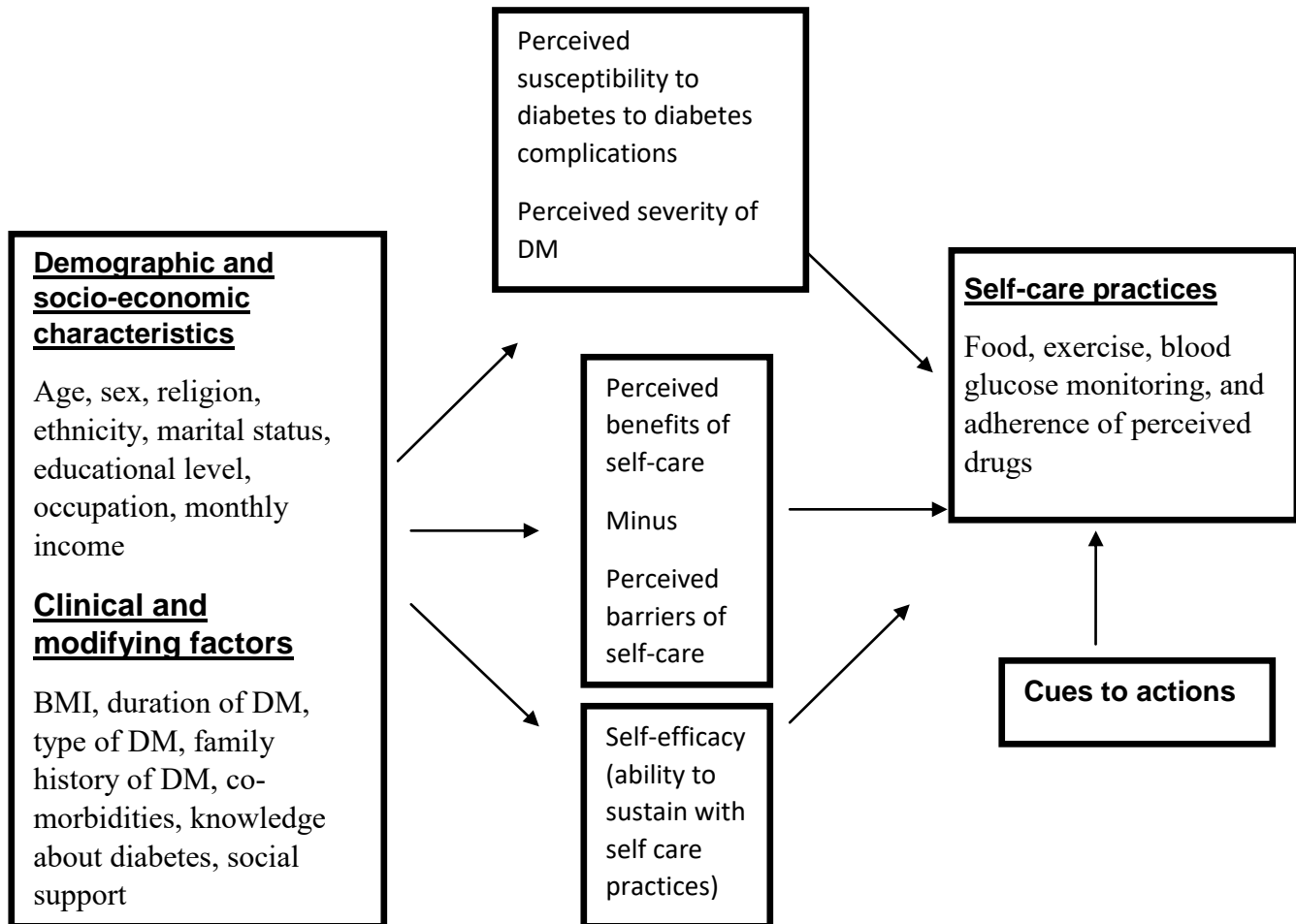
Figure No 4: health belief model used to assess self-care practice

2.8 Global Report of World Health Organization on Diabetes:

The WHO Global Report on Diabetes indicated that being overweight or obese is the strongest risk factor for type 2 diabetes mellitus. The increase of overweight rate and obesity rate also affect the incidence of diabetes in different degrees. The incidence of diabetes varies from region to region and is affected by many factors (quality of life) in people with diabetes could

be improved certain interventions, including the introduction of blood-glucose-lowering agents, changes in insulin delivery systems, modification in food intake, educational and counseling programs designed to facilitate the development of diabetes-specific coping skill by sufficient nutritional knowledge.

Table 2: WHO Global Report of diabetes

	2020	2035
Total world population (billions)	**7.2**	**8.7**
Adults population (30-79 years, billion	**4.6**	**5.9**
DIABETES (30-79 YEARS)		
Diabetes Global prevalence (%)	**8.3**	**10.1**
Comparative prevalence (%)	**8.3**	**8.8**
Number of people with diabetes (millions)	**382**	**592**

2.9 Role of dietitian for medical nutritional therapy:

Individuals who have pre-diabetes or diabetes should receive individualized MNT; such therapy is best provided by a registered dietitian familiar with the components of diabetes MNT. Nutrition counseling should be sensitive to the personal needs, willingness to change, and ability to make changes of the individual with pre-diabetes or diabetes. Individuals with type 2 diabetes are encouraged to implement lifestyle modifications that reduce intakes of energy, saturated and Tran's fatty acids, cholesterol, and sodium and to increase physical activity in an effort to improve glycemia, dyslipidemia, and blood pressure. Plasma glucose

monitoring can be used to determine whether adjustments in foods and meals will be sufficient to achieve blood glucose goals or if medication needs to be combined with MNT. Healthy lifestyle nutrition recommendations for the general public are also appropriate for individuals with type 2 diabetes. Because many individuals with type 2 diabetes are overweight and insulin resistant, MNT should emphasize lifestyle changes that result in reduced energy intake and increased energy expenditure through physical activity. Because many individuals also have dyslipidemia and hypertension, reducing saturated and Trans fatty acids, cholesterol, and sodium is often desirable. Therefore, the first nutrition priority is to encourage individuals with type 2 diabetes to implement lifestyle strategies that will improve glycemia, dyslipidemia, and blood pressure. MNT progresses from prevention of overweight and obesity, to improving insulin resistance and preventing or delaying the onset of diabetes, and to contributing to improved metabolic control in those with diabetes. The health services in the community in Pakistan are not adequate and diabetes health management programmed in the community health clinics does not provide enough help and support to the patients. Shortage of community doctors, nutritionist and expensive consultation with private doctors make the life of patients more difficult in term of managing their diabetes and increase their knowledge about dietary intake in Pakistan. (Ansari et al., 2015)

2.10 Conceptual Framework:

Based on the previous literature, a conceptual framework of the present study was developed that highlight the intervention given to diabetic patients by using health belief model and increasing nutritional knowledge of patients for decreasing health care future burden.

Health Belief model:

Perceived susceptibility

Perceived severity

Perceived Benefits

Perceived barrier

Perceived Self-efficacy

Demographic factors reasons for diabetes:

Age

Gender

Education

Marital status

Family history

BMI

Diabetic patients

Nutrition Education:
Planned sequential instruction that provides knowledge and teaches skills to help diabetic patients adopt and maintain lifelong healthy eating habits.

Interventions for minimizing future complications:

Spend at least 1 hour a day being physically active

Snacking on healthy low glycemic index food

6-8 glasses of water per day

7-8 hours sleep per day

Drink skimmed milk daily

Take one serving of recommended fruit daily

Avoid whole wheat grains

Avoid carbonated and fresh fruits juices

Figure No 5: Conceptual framework

2.11   Operational Definitions:

Nutritional knowledge: It is the knowledge about the food groups, dietary guidelines and associations of diet and disease.

Diabetes Mellitus: Diabetes Mellitus is a group of metabolic diseases characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both.

Type 1: Characterized by beta cell destruction caused by an autoimmune process.

Type 2: Characterized by insulin resistance in peripheral tissue and an insulin secretary defect of the beta cells.

Complication: The disease can become worse in its severity or show a higher number of signs, symptoms or new pathological change.

Interventional Research: Research examines the effects of an intervention on an outcome of interest.

Nutrition Education: Set of learning experiences designed to assist in healthy eating choices and nutritional-related behavior.

Nutraceutical: Any part of a food that is able to induce medical and health benefits including the prevention and treatment of disease.

Self-care: Activities those are necessary to sustain life and health, normally initiated and carried out by the individual for him or herself

CHAPTER III: METHODOLOGY

3.1 Research Design:

A quantitative research approach using quasi-experimental study design was used for the current study.

3.2 Research Duration:

Study period for the current research was six months from 1-March to 31-August.

3.3 Study Setting:

The study was carried out at Fauji foundation hospital and Benazir Bhutto hospital Rawalpindi city.

3.4 Research Participants:

Diabetic patients were selected on the basis of inclusion and exclusion criteria.

Inclusion Criteria:

1. Patients diagnosed with type 2 diabetes.

2. Adult patients of age $\geq$ 30years.

3. Both male and female patients were included.

4. Literate, having smart phone,

5. Signing an informed written consent.

Exclusion Criteria:
1. Patients who didn't understand Urdu language.

2. Patients who were not willing to participate in the study.

3. Mentally challenged patients and major co-morbidities.

4. Illiterate, not having smart phone.

3.5 Sampling Strategy:

Desired sample was collected using non-probability purposive sampling strategy.
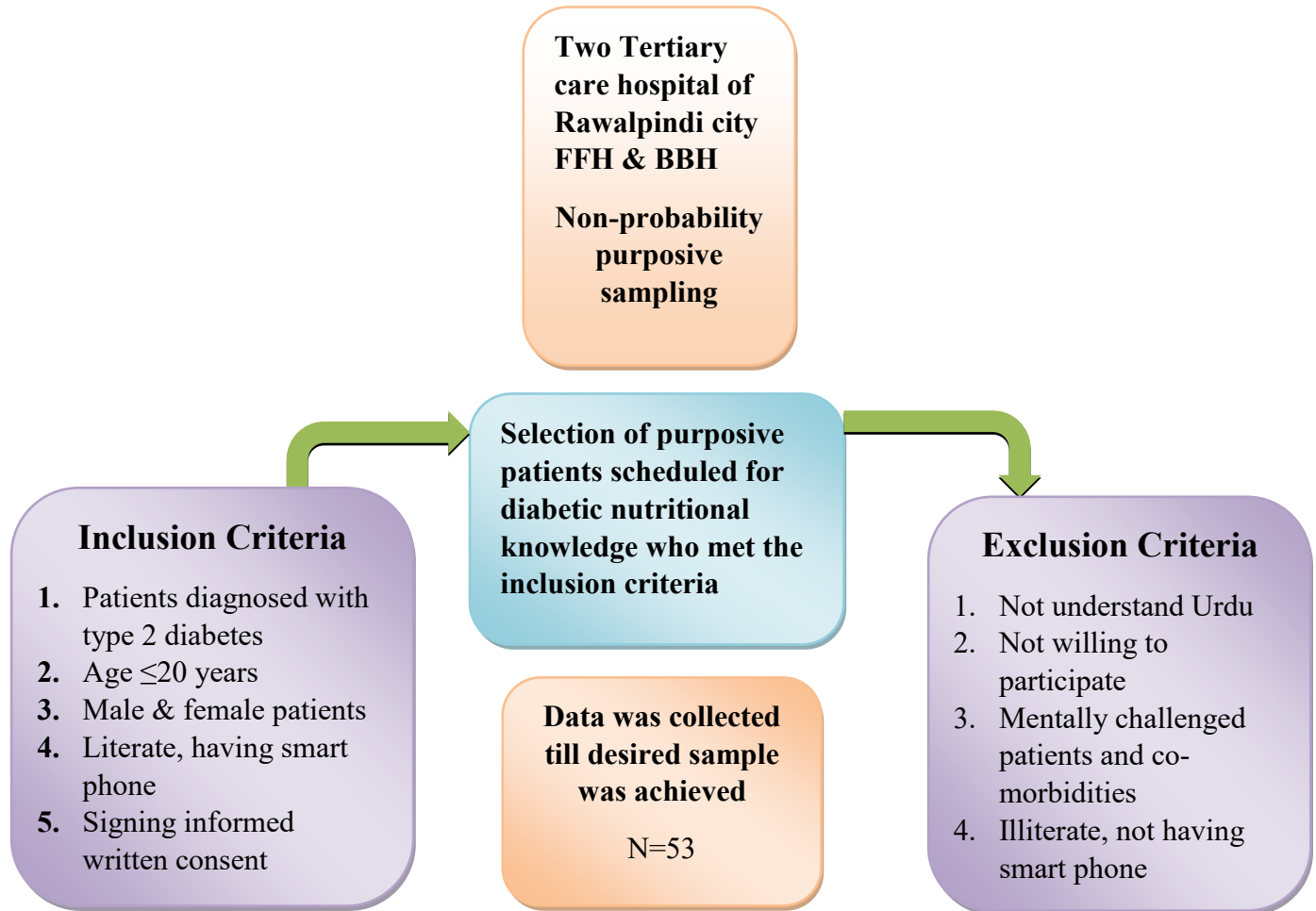
Figure No 6: Sampling strategies for this study

3.6 Sample Size Calculation:

Sample size was calculated using proportion formula for sample size calculation in OpenEpi menu, Version 3.01 software. Previous prevalence of diabetic patient's nutritional knowledge was taken as 54.6% as reported by a study conducted in, Pakistan in 2017 (Aurang Zeb, 2017).

Calculated sample size was 48 with 95% confidence interval (C.I) and 5% margin of error. After adding 5% non-response rate, final sample size came out to be 53 diabetic patients. In this interventional study we take data before and after the intervention from selected diabetic patients.

3.7 Data Collection Instrument:

3.7.1. Questionnaire Design:

Data was collected using an interview-based diabetes-related nutrition knowledge (DRNK-Q) questionnaire. A Performa was developed to collect data regarding socio-demographic characters of the respondent, Nutritional knowledge of patients, and Behaviors of patients by applying Health Belief Model components. Questionnaire is attached in Annexure-I.

3.7.2. Content of the Questionnaire:

The questionnaire contained five major sections:

1. **Section A:** included questions related to socio-demographic characters.

   Section B: included questions related to nutritional knowledge in these section total 17 questions included about food categories and food groups. This section of the questionnaire asked question about different food groups and about their relative importance for diabetic patients, like carbohydrates, processed food and dairy. In this section also included questions related to Habit of food intake related to diabetes on weekly basis in this focused on the consumption frequency of different food groups. All the questions here were measured on 4 point Likert scale. The frequency of food intake was measured on weekly basis where 0= no intake, 1=1-2 times /weeks, 2=3-4 times/week and 4=>4 times/week.

2. **Section C: i**ncluded questions related to behaviors of respondents according to health belief model components scoring by likert scale three option given agree and disagree. In this section total five components of health belief model use for checking behaviors of respondents. First component is perceived susceptibility included total 3 questions. Second component is perceived severity included total 4 questions. Third component is perceived benefits included total 4 questions. Fourth component is perceived barrier included total 5 questions. Fifth component is perceived self-efficacy included total 3 questions.

3.8. Data Collection Process:

3.8.1. Pilot Testing:

Pilot testing was performed before starting the formal data collection procedure by including 10% of the actual sample size. Performa was tested for any future changes; some major changes in questionnaire were done after pilot testing. Data from pilot testing was not included in final analysis. Pilot testing showed that reliability of nutritional knowledge questionnaire was 0.519 while reliability of self-design questionnaire HBM scale was 0.656. So, we change some questions and use more precised wording easy to understand for patients and some changes done in coding of questionnaire. The reliability was assessed using Cronbach's alpha coefficient and it was found reliable (0.992).

3.8.2. Data Collection:

All the patients in OPD wards of the selected tertiary hospital were approached. Consent was taken orally from all patients and only those patients were selected who agreed to take part in the research process and fulfill the inclusion criteria. After taking the consent, the patients were interviewed and their responses were recorded by the researcher. After taking data

researcher gave the 20 minutes' nutritional awareness intervention and try to change her/his dietary behavior by the help of health belief model and take the smart phone number for taking again data after one week.

3.9. Data Analysis Procedure:

3.9.1. Descriptive Analysis:

Descriptive statistics were generated for socio-demographic characteristics, reasons for poor nutritional knowledge and outcome variable. Data was summarized in the form of frequencies and percentages and presented in table form, Bar chart and Pie chart.

3.9.2. Inferential Analysis:

Association of nutritional education on the knowledge of diabetic patient was determined with socio-demographic and outcome variables using paired T test.

3.9.3 Data analysis plan:

Code book was developed and data was entered in Statistical Package for Social Sciences (SPSS) version 26.

After careful data entry, data was checked for any error before proceeding to the further analysis.

After data cleaning, data transformation was carried out for certain variables.

Data analysis was done in two phases;

1. Descriptive analysis
2. Inferential analysis

```
                    ┌─────────────────────┐
                    │     Data Entry      │
                    └─────────────────────┘
                              ⇓
                    ┌─────────────────────┐
                    │    Data Cleaning    │
                    └─────────────────────┘
                              ⇓
                    ┌─────────────────────┐
                    │    Data Analysis    │
                    └─────────────────────┘
```

Descriptive Analysis   **Inferential Analysis**

Frequencies and percentages   **Paired T Test**
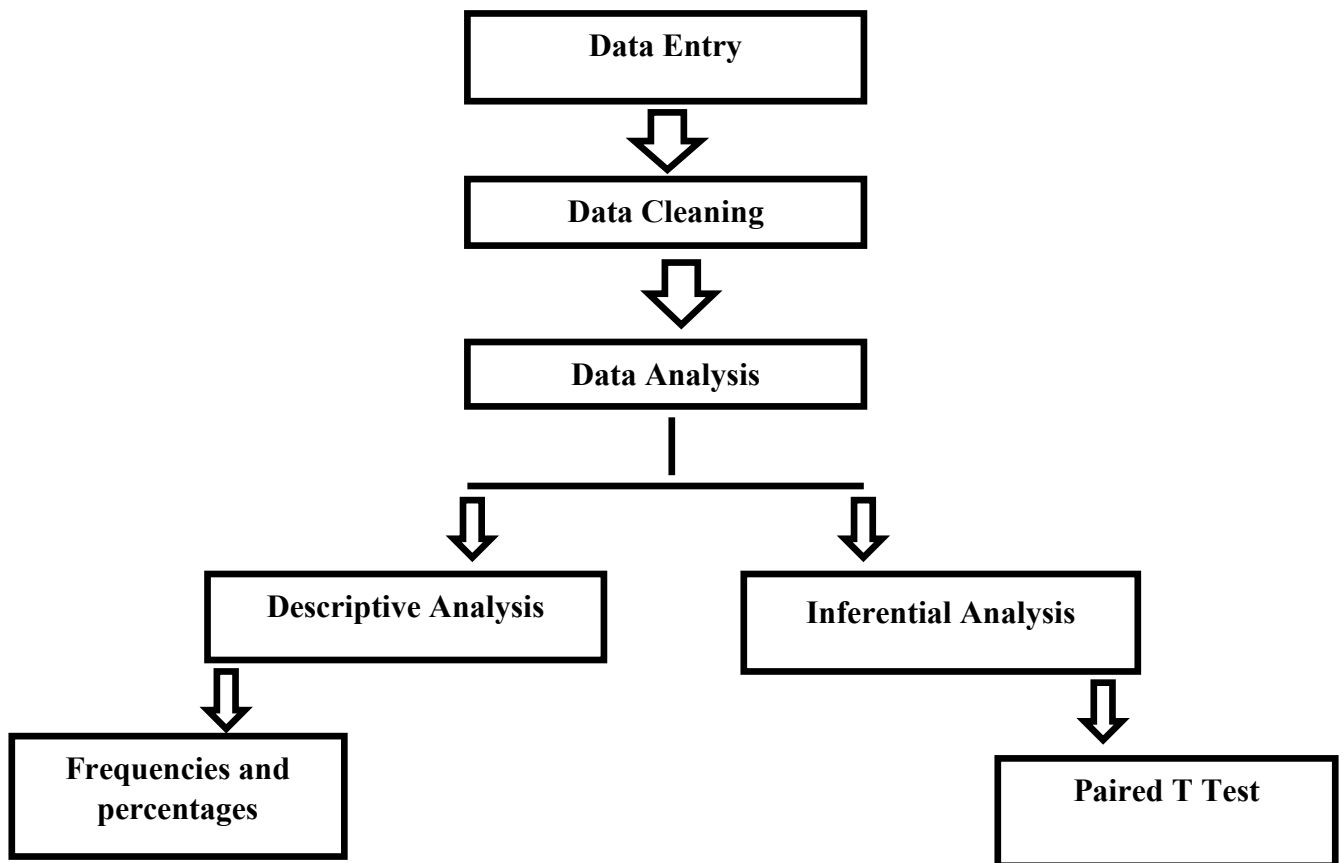
Figure No 7: Data Analysis Plan

3.10. Intervention:

Increased physical activity by individuals with type 2 diabetes can lead to improved glycemia, decreased insulin resistance, and a reduction in cardiovascular risk factors, independent of change in body weight. At least 150 min/week of moderate-intensity aerobic physical activity, distributed over at least 3 days and with no more than 2 consecutive days without physical activity is recommended. Carbohydrate's direct impact is to raise blood sugar levels and therefore too much carbohydrate can cause problems for people with diabetes. When you eat a balanced diet, you give your body the nutrients it needs for healthy functioning. A balanced

diet is the same as a complete diet because it has the right proportion of minerals, vitamins, other essential nutrients, and optimal calories for your body's makeup. When people with diabetes in one study consumed 50 grams of fiber per day, they had better blood sugar control than those who consumed just 24 grams per day. Half of this fiber was soluble, which is found in fruits, such as apples, oranges and pears. Most of the fat in milk is an unhealthy kind. When you can, choose low-fat or fat-free milk, so you get calcium and other nutrients without the added fat. The carbs in milk breaks down and become sugar in your bloodstream. With both type 1 and type 2 diabetes, you have to watch your carbs. Drinking too much milk may cause a spike in your blood sugar. A diabetes diet is a healthy-eating plan that's naturally rich in nutrients and low in fat and calories. Key elements are fruits, vegetables and whole grains. A diabetes diet is based on eating three meals a day at regular times. This helps you better use the insulin that your body produces or gets through a medication. Sugar is a naturally-occurring carbohydrate that's found in many fruits, dairy, grains, and even vegetables. Consuming these whole foods that naturally have sugar is fine because they are also full of vitamins, minerals, fiber, and antioxidants that are important for a well-rounded diet. The main issue with sugar is when it's found in processed foods with added sugar. The sugar found in an apple is very different from the sugar found in an ice-cream, and your body can tell the difference. Consuming whole and unprocessed foods, such as vegetables, fruits, meats, whole grains, and non-homogenized dairy products, has immense health benefits as they're rich in nutrients and contain fewer additives than heavily processed foods. A daily multivitamin supplement may be appropriate, especially for those older adults with reduced energy intake. Individuals at high risk for type 2 diabetes should be encouraged to achieve the USDA recommendation for dietary fiber (14 g fiber/1,000 kcal) and foods containing whole grains

(one-half of grain intakes). Monitoring carbohydrate, whether by carbohydrate counting, an exchange, or experienced-based estimation, remains a key strategy in achieving glycemic control. The use of glycemic index and load may provide a modest additional benefit over that observed when total carbohydrate is considered alone. Sucrose-containing foods can be substituted for other carbohydrates in the meal plan or, if added to the meal plan, covered with insulin or other glucose-lowering medications. Sugar alcohols and non-nutritive sweeteners are safe when consumed within the daily intake levels established by the FDA. Limit saturated fat to 7% of total calories. Take of Tran's fat should be minimized. In individuals with diabetes, lower dietary cholesterol to 200 mg/day. For individuals using fixed daily insulin doses, carbohydrate intake on a day-to-day basis should be kept consistent with respect to time and amount. The use of glycemic index may provide a modest benefit. Weight loss has been shown to improve insulin resistance. The preferred distribution for diabetic patient's diet would be comprised of 45% to 65% of energy intake from carbohydrates, 10% to 35% from protein, and 20% to 35% from fat. Be moderate in protein intake (for example, lean meat, skinless chicken, fish and eggs). Select foods high in fiber (for example, wholegrain bread, fruit and vegetables). Saturated fats (for example, meat fat, butter, cream, cheese, cooking margarine, palm oil, coconut milk/cream, processed snacks and take-away foods) High fiber foods have a low GI. People who eat 3+ servings per day of whole grain foods have a 20% to 30% reduced risk of developing type 2 diabetes. The ADA recommends a daily intake of at least 14 g fiber/1000 kcal and foods with whole grains to prevent diabetes. Oat bran flour and barley are good examples of fibers high in beta-glucan and can decrease postprandial glycolic response in diabetes. Protein restriction is not generally recommended in diabetes unless there is nephropathy; even so it is wise to limit proteins to < 20% of the total energy intake.
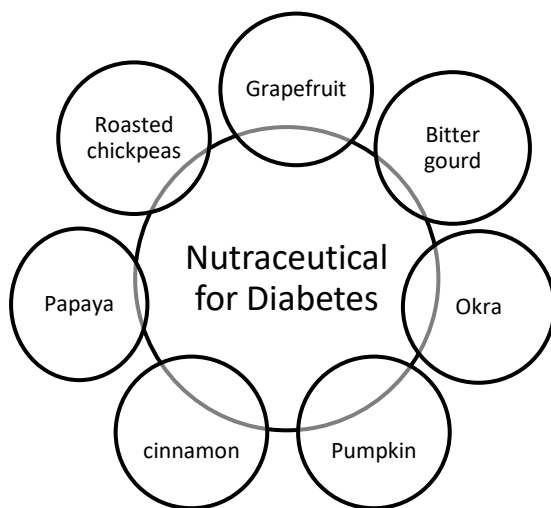
Figure No 8: Nutraceutical for diabetes patients

Figure No 9: Nutritional Support and dietary interventions for Diabetes mellitus

3.11. Ethical Considerations:

Before starting formal data collection, approval from Institutional Review Board (IRB) of Al-Shifa School of Public Health Rawalpindi, Pakistan has been taken (Annexure-4). Permission letter from the Head of Department of Al-Shifa School of Public Health was obtained regarding access to various cardiac centers. Permission was taken from the cardiac centers of Rawalpindi city for conducting research. Patients were explained the purpose of the research and oral consent was taken from each participant (Annexure-3). Participants were assured for the confidentiality of their data. Data collected from the respondents was kept anonymous and was not shared with anyone. Data was entered in SPSS anonymously. After data entry, hard copies of collected were kept at a safe place.

CHAPTER IV: RESULTS

For the current study, data of 106 Diabetic patients, who were visited the Tertiary hospitals and willing to participate in interventional study, was collected. A summary of descriptive and inferential analysis is given below.

4.1 Socio Demographics characteristics:

Socio demographic characteristics are those characteristics of the people on which the study is being carried out. Age, Gender, Education level, Monthly income, Place of residence and smoking history are a few examples of socio demographic variables. It makes sure that the respondents enrolled in the study are the true representative of the chosen population and therefore the results of the study can be generalized.

4.2 Descriptive results for demographic variables:

Using Statistical Package for Social Sciences (SPSS) version 21, frequencies and percentages were run for all demographic qualitative/categorical variables of respondents.

Demographic characteristics of the respondents are shown in table and Figure given below:

Table No 3: Demographics of respondents

S. No	Variable	Frequency (n)	Percentage (%)
1.	**Age**		
	25-35 years	9	17.0
	36-50 years	14	26.4
	51-64 years	18	34.0
	65 and above	12	22.6
2.	**Gender**		
	Male	25	47.2
	Female	28	52.8
3.	**Marital status**		
	Married	50	94.3
	Unmarried	3	5.7
4.	**Smoking history**		
	Smoker	20	37.7
	Nonsmoker	33	62.3
5.	**Place of residence**		
	Urban	21	39.6
	Rural	32	60.4
6.	**Employment status**		
	Employed	33	62.3
	Unemployed	20	37.7
7.	**Monthly income**		
	20-50k	19	35.8
	51-100k	14	26.4
	More than 100k	20	37.7
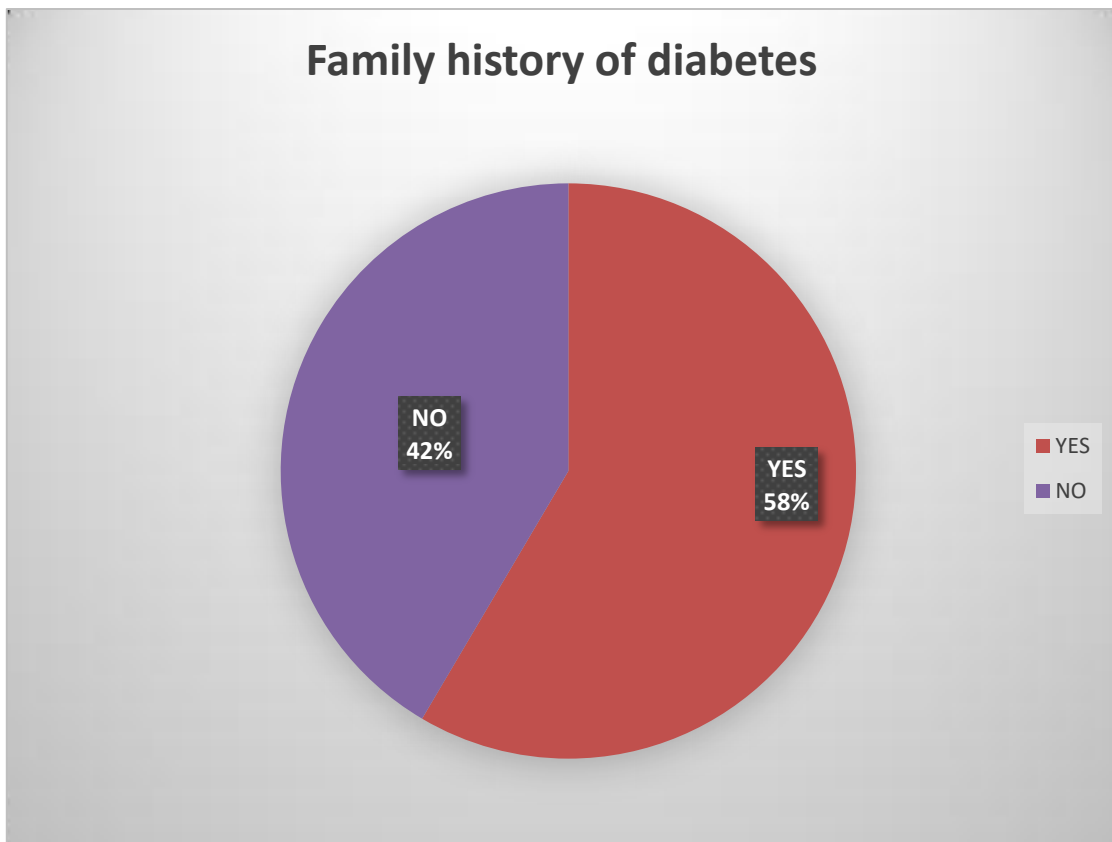
Figure No 10: Family history of diabetes mellitus

Family history of respondents is shown in figure divided in to two categories Yes and No. The data shows that respondents 31±58.5 have family history of diabetes mellitus and 22±41.5 have no family history of diabetes mellitus.
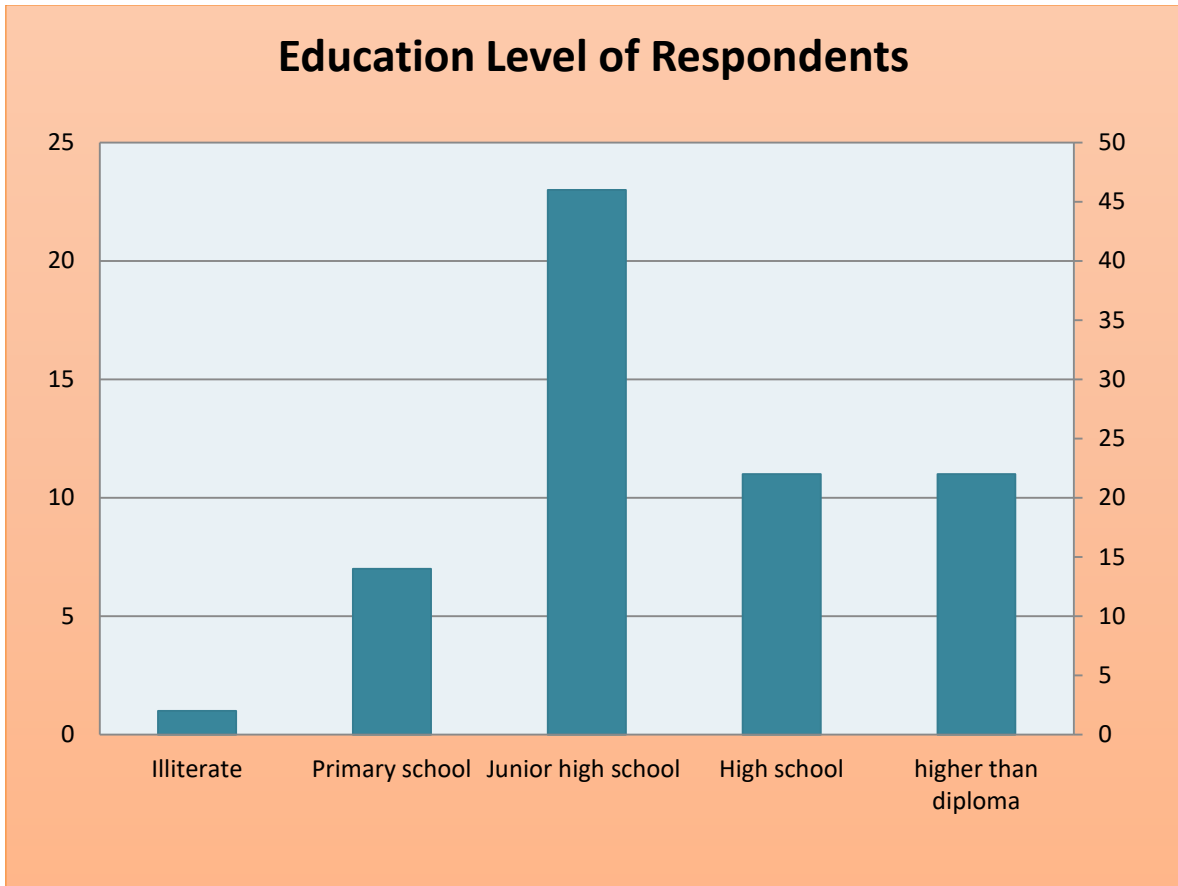
Figure No 11: Education level of respondents

The data on the education level of respondents have been shown in figure, it shows that vast majority (23±43.4) of respondents were having qualification of junior high school level.
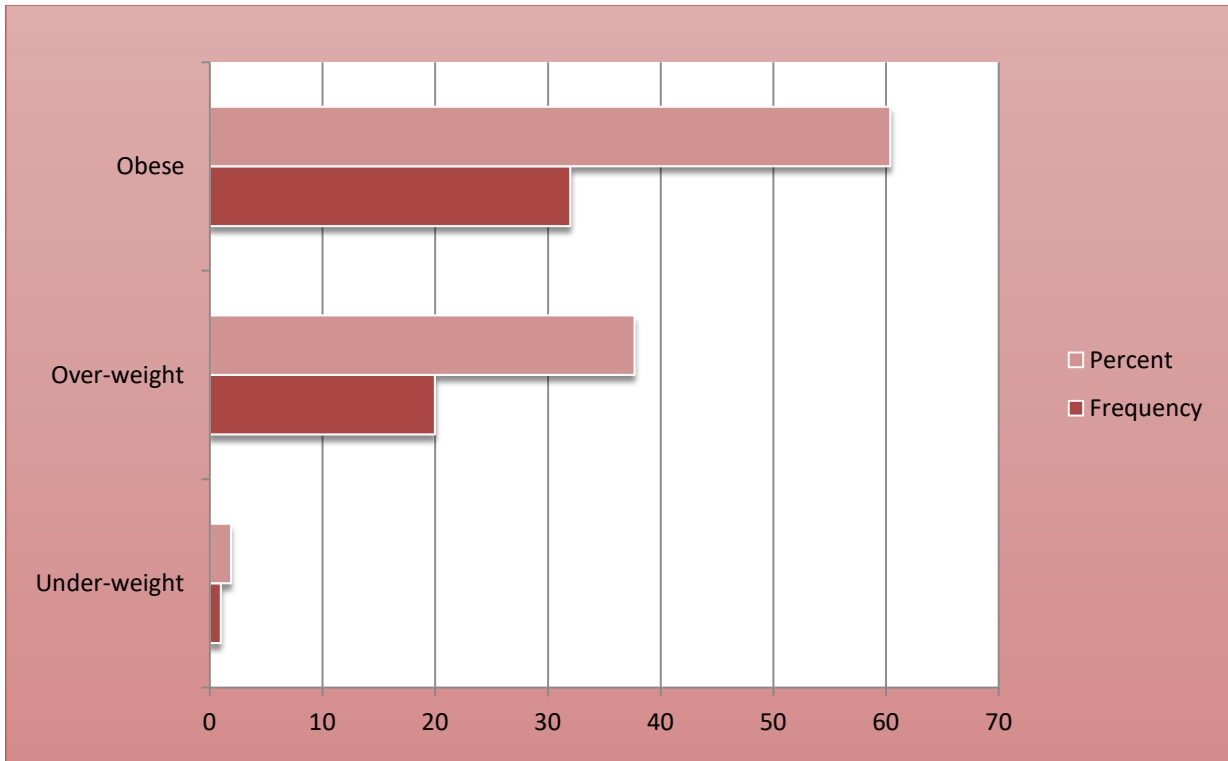
Figure No 12: Body Mass Index of respondents

Data about the BMI of the respondents is shown in figure. More than half (32±60.4) of the respondents were obese and rest (20± 37.7) is over-weight.

A total of 53 respondents were included in this study. Majority of the respondents were Female (n=28, 52.8%) and were 51-64 years of age group (n=18, 34.0%). Majority of the respondents were from rural area (n=32, 60.4%), have family history of Diabetes (n=31, 58.5%), have BMI lie in obese category (n=32, 60.4%). More Patients with smoking history (n=33, 62.3%), more patients are married (n=50, 94.3%), education level of more patients is junior high school (n=23, 43.4%), and Employment status is higher in patients (n=33, 62.3%).

4.3 Descriptive Results for Outcome Variable:

Table No 4: Nutritional knowledge and practices of respondent

S. No	Nutritional knowledge	Frequency (n)		Percentage (%)	
		Before	After	Before	After
1	**What is a good balance diet?**				
	Full of mineral source	24	0	45.3	0
	All essential nutrients	0	53	0	100.0
	Diet I crave for	29	0	54.7	0
2	**Food group not good for diabetic patient?**				
	Carbohydrates	1	39	1.9	73.6
	Milk and milk products	23	10	43.4	18.9
	Fruits and vegetable	29	4	54.7	7.5
3	**Foods you think are rich in sugar?**				
	Banana	51	0	96.2	0
	Potatoes	1	0	1.9	0
	Whole wheat chapatti	1	0	1.9	0
	All of them	0	53	0	100.0
4	**Type of dairy diabetic patients should consume?**				
	Full fat milk	1	0	1.9	0
	Skim milk	5	53	9.4	100.0
	Do not consume any dairy	47	0	88.7	0
5	**As compared to natural food, processed foods are good for diabetic patients?**				
	Yes	34	0	64.2	0
	No	4	53	7.5	100.0
	Not sure	15	0	28.3	0
6	**Which dietary behaviors can help diabetic patients to achieve good health?**				

	Eating few variety of food	37	14	69.8	26.4
	Eating modified balance diet	16	39	30.2	73.6
7	**Sugary snacks**				
	No intake	0	37	0	69.8
	1-2 times/week	0	10	0	18.9
	3-4 times/week	32	6	60.4	11.3
	More than 4 times/week	21	0	39.6	0
8	**Canned fruits/cocktails**				
	No intake	0	35	0	66.0
	1-2 times/week	0	15	0	28.3
	3-4 times/week	43	3	81.1	5.7
	More than 4 times/week	10	0	18.9	0
9	**Bakery products**				
	No intake	5	24	9.4	45.3
	1-2 times/week	2	22	3.8	41.5
	3-4 times/week	33	3	62.3	5.7
	More than 4 times/week	13	4	24.3	7.5
10	**Soft drinks and packaged juices**				
	No intake	0	30	0	56.6
	1-2 times/week	0	15	0	28.3
	3-4 times/week	30	8	56.6	15.1
	More than 4 times/week	23	0	43.4	0
11	**Potatoes**				
	No intake	0	35	0	66.0
	1-2 times/week	0	15	0	28.3
	3-4 times/week	29	3	54.7	5.7
	More than 4 times/week	24	0	45.3	0
12	**Rice**				
	No intake	0	16	0	30.2
	1-2 times/week	3	37	5.7	69.8
	3-4 times/week	21	0	39.6	0
	More than 4 times/week	29	0	54.7	0
13	**Fruits**				
	No intake	3	1	5.7	1.9
	1-2 times/week	13	0	24.5	0
	3-4 times/week	27	12	50.9	22.6
	More than 4 times/week	10	40	18.9	75.5

14	**Skimmed milk**				
	No intake	15	5	28.3	9.4
	1-2 times/week	14	2	26.4	3.8
	3-4 times/week	18	5	34.0	9.4
	More than 4 times/week	6	41	11.3	77.4
15	**Table sugar/Gur**				
	No intake	0	29	0	54.7
	1-2 times/week	8	22	15.1	41.5
	3-4 times/week	34	2	64.2	3.8
	More than 4 times/week	11	0	20.8	0
16	**Whole wheat grains**				
	No intake	0	4	0	7.5
	1-2 times/week	1	31	1.9	58.5
	3-4 times/week	5	18	9.4	34.0
	More than 4 times/week	47	0	88.7	0
17	**Did anyone counsel you regarding nutritional requirement after diagnosis of diabetes?**				
	Yes	1	53	1.9	100.0
	No	52	0	98.1	0

53 Questionnaires were interviewed from diabetic patients of tertiary hospitals of Rawalpindi city, Table 4 indicate information about frequency and means of Nutritional Knowledge and practices of respondents before and after intervention. The first category indicate the good balance diet 45.3% responses are full of mineral source and 54.7% responses are diet I crave for before intervention but after intervention given to all patients 53 responses are all essential nutrients. The next category indicates the food group not good for diabetes before intervention (N=29) 54.7% responses are fruits and vegetable but after intervention mostly patient response are (N=39) 73.6% carbohydrates. The next category indicates the food you think are rich in sugar before intervention mostly responses are (N=51) 96.2% banana but after intervention mostly responses are all foods given in question. The next category is type of diary diabetic should consume before intervention mostly responses are (N=47) 88.7% do not consume any diary but after intervention mostly responses are skim milk. The next category indicate the processed foods are good for diabetic patients before intervention mostly responses are (N=34)

64.2% yes but after intervention mostly responses are No. The next category indicate the dietary behaviors can help diabetic patients to achieve good health before intervention mostly responses are (N=37) 69.8% eating few variety of food but after intervention mostly responses are (N=39) 73.6% eating modified balance diet. The next category indicates the respondent's intake of sugary snacks before intervention mostly respondent's intake (N=32) 60.4% 3-4times/week but after intervention mostly respondents (N=37) 69.8% No intake. The next category indicates the canned fruits intake (N=43)81.1% respondent's intake 1-2times/week before intervention but after intervention (N= 35) 66.0% have no intake. The next category indicates the respondent's bakery products intake (N=33) 62.3% 3-4 times/week before intervention but after intervention (N=24) 45.3% have no intake. The next category indicates the soft drinks intake of respondents (N=30) 56.6% 3-4 times/week before intervention but after intervention (N=30) 56.6% have no intake. The next category indicates the respondent's intake of potatoes (N=29)54.7% 3-4 times/week before intervention but after intervention (N=35) 66.0% have no intake. The next category indicates the respondent's intake of rice (N=29) 54.7% more than 4 time/week but after intervention (N=37) 69.8% have intake 1-2 time/week. The next category indicates the respondents intake of fruits (N=27) 50.9 3-4 times/week before intervention but after intervention intake of respondents (N=40) 75.5% more than 4 times/ week. The next category indicates the respondents intake of skimmed milk (N=18) 34.0% 3-4 times/week before intervention but after intervention intake of respondents (N=41) 77.4% more than 4 times/week. The next category indicates the respondents intake of table sugar/gur (N= 34) 64.2% 3-4 times/week but after intervention (N=29) 54.7% have no intake. The next category indicates the respondents intake of whole wheat grains (N=47) 88.7% more than 4 times/week but after intervention (N=31) 58.5% 1-2 times/week. The next category indicates "did anyone counsel you regarding nutritional requirement after diagnosis of diabetes" (N=52) No before intervention but after intervention all responses are Yes.

Table No 5: Health Belief Model Components (HBM)

S.No	Perceived susceptibility	Frequency (n)		Percentage (%)	
		Before	After	Before	After
1	Too much table sugar intake can be a major source of diabetes				
	Agree	41	17	77.4	32.1
	Disagree	12	36	22.6	67.9
2	Diabetes is a genetic disease not affected by any type of diet taken				
	Agree	33	15	62.3	28.3
	Disagree	20	38	37.7	71.7
3	Diabetes only control by the insulin not controlled by the diet modification				
	Agree	39	16	73.6	30.2
	Disagree	20	37	26.4	69.8

53 Questionnaires were interviewed from diabetic patients of tertiary hospitals of Rawalpindi city, Table 5.1 indicate information about frequency and means of Health Belief model component perceived susceptibility of respondents before and after intervention. The first category indicates the "too much table sugar intake can be a major source of diabetes" (N=41) 77.4% respondents are agree before intervention but after intervention (N=36) 67.9% disagree. The category indicates the "diabetes is a genetic disease not affected by any type of diet taken" (N=33) 62.3% agree but after intervention (N=38) 71.7% disagree. The next category indicates the "diabetes only control by the insulin not by diet modification" (N=39) 73.6% agree before intervention but after intervention (N=37) 69.8% disagree.

S.No	Perceived severity	Frequency (n)		Percentage (%)	
		Before	After	Before	After
1	Diabetes is a disease which is curable with diet management				
	Agree	9	41	17.0	77.4
	Disagree	44	12	83.0	22.6
2	Specific diet recommended for people with diabetes				
	Agree	13	43	24.5	81.1
	Disagree	40	10	75.5	18.9
3	Diet and exercise make a difference to your overall health if you have diabetes				
	Agree	8	43	15.1	81.1
	Disagree	45	10	84.9	18.9
4	Patients of diabetes stay longer in hospital after uncontrolled diabetes condition develop due to not timely cure				
	Agree	12	45	22.6	84.9
	Disagree	41	9	77.4	15.1

53 Questionnaires were interviewed from diabetic patients of tertiary hospitals of Rawalpindi city, Table 5.2 indicate information about frequency and means of Health Belief model component perceived severity of respondents before and after intervention. The first category indicates the "Diabetes is a disease which is curable with diet management" (N=44) 83.0% respondents are disagree before intervention but after intervention (N=41) 77.4% agree. The category indicates the "Specific diet recommended for people with diabetes" (N=40) 75.5% disagree but after intervention (N=43) 81.1% agree. The next category indicates the "diet and exercise make difference to your overall health if you have diabetes" (N=45) 84.9% disagree before intervention but after intervention (N=43) 81.1% agree. The next category indicates the "Patients of diabetes stay longer in hospital after uncontrolled diabetes condition develop due to not timely cure" (N=41) 77.4% disagree before intervention but after intervention (N=45) 84.9% agree.

S.No	Perceived Benefits	Frequency (n)		Percentage (%)	
		Before	**After**	**Before**	**After**
1	**Following diet instruction from health care provider will keep me from having high blood glucose level**				
	Agree	3	44	5.7	83.0
	Disagree	50	9	94.3	17.0
2	**My family members always cook my food according to the instruction given by the health care provider**				
	Agree	9	44	17.0	83.0
	Disagree	44	9	83.0	17.0
3	**Regular exercise can prevent me from developing complications of diabetes in my body**				
	Agree	8	44	15.1	83.0
	Disagree	45	9	84.9	17.0
4	**Since blood sugar level is an important factor in diabetes treatment therefore I am concerned about my blood sugar level**				
	Agree	13	49	24.5	92.5
	Disagree	40	4	75.5	7.5

53 Questionnaires were interviewed from diabetic patients of tertiary hospitals of Rawalpindi city, Table 5.3 indicate information about frequency and means of Health Belief model component perceived benefits of respondents before and after intervention. The first category indicates the "following diet instruction from health care provider will keep me from having high blood glucose level" (N=50) 94.3% respondents are disagree before intervention but after intervention (N=44) 83.0% agree. The category indicates the "My family members always cook my food according to the instruction given by the health care provider" (N=44) 83.0%

disagree but after intervention (N=44) 83.0% agree. The next category indicates the "Regular exercise can prevent me from developing complications of diabetes in my body" (N=45) 84.9% disagree before intervention but after intervention (N=44) 83.0% agree. The next category indicates the "Since blood sugar level is an important factor in diabetes treatment therefore I am concerned about my blood sugar level" (N=40) 75.5% disagree before intervention but after intervention (N=49) 92.5% agree.

S.No	Perceived Barrier	Frequency (n)		Percentage (%)	
		Before	After	Before	After
1	In diabetes recommended diet is taste less				
	Agree	44	9	83.0	17.0
	Disagree	9	44	17.0	83.0
2	My family members do not encourage me to exercise regularly and follow the diabetic diet plan				
	Agree	52	10	98.1	18.9
	Disagree	1	43	1.9	81.1
3	My family have no time to prepare separate diabetic modified diet				
	Agree	45	10	84.9	18.9
	Disagree	8	43	15.1	81.1
4	The cost of the recommended foods to eat according to meal plan is expensive				
	Agree	44	9	83.0	17.0
	Disagree	9	44	17.0	83.0
5	It need much time to prepare my food				
	Agree	41	9	77.4	17.0
	Disagree	12	44	22.6	83.0

53 Questionnaires were interviewed from diabetic patients of tertiary hospitals of Rawalpindi city, Table 5.4 indicate information about frequency and means of Health Belief model

component perceived barriers of respondents before and after intervention. The first category indicates the "diabetes recommended diet is taste -less" (N=44) 83.0% respondents are agree before intervention but after intervention (N=44) 83.0% disagree. The category indicates the "My family members do not encourage me to exercise regularly and follow the diabetic diet plan" (N=52) 98.1% agree but after intervention (N=43) 81.1% disagree. The next category indicates the "My family have no time to prepare separate diabetic modified diet" (N=45) 84.9% agree before intervention but after intervention (N=43) 81.1% disagree. The category indicates the "The cost of the recommended foods to eat according to meal plan is expensive" (N=44) 83.0% agree but after intervention (N=44) 83.0% disagree. The next category indicates the "It need much time to prepare my food" (N=41) 77.4% agree before intervention but after intervention (N=44) 83.0% disagree.

S.No	Perceived Self-efficacy	Frequency (n)		Percentage (%)	
		Before	**After**	**Before**	**After**
1	**I stay on my diet when I eat out**				
	Never	46	7	86.8	13.2
	Sometime	7	3	13.2	5.7
	Always	0	43	0	81.9
2	**I follow all instructions from the health care for my diet**				
	Never	46	3	86.8	5.7
	Sometime	7	7	13.2	13.2
	Always	0	43	0	81.1
3	**I always say to myself that exercise is important for me**				
	Never	43	3	81.1	5.7
	Sometime	10	7	18.9	13.2
	Always	0	43	0	81.1

53 Questionnaires were interviewed from diabetic patients of tertiary hospitals of Rawalpindi city, Table 5.5 indicate information about frequency and means of Health Belief model component perceived self-efficacy of respondents before and after intervention. The first category indicates the "I stay on my diet when I eat out" (N=46) 86.8% mostly respondent's response is never before intervention but after intervention (N=43) 81.9% response are always. The category indicates the "I follow all instruction from the health care for my diet" (N=46) 86.8% respondents say never but after intervention (N=43) 81.1% respondent's response are always. The next category indicates the "I always say to myself that exercise is important for me" (N=43) 81.1% responses are never before intervention but after intervention (N=43) 81.1% respondent responses are always.

4.4. Inferential Analysis:

The Paired t-Test compares the means of two measurements taken from the same participant.

Table No 6: Result of outcome variable

Paired T-Test	N	Mean difference	MEAN	t	LLCI	ULCI	P-VALUE
Nutritional Knowledge before intervention_Nutritional Knowledge after intervention	53	**10.83 ±32.91**	-22.075	-59.329	-22.822	-21.329	0.000
Behavior changes by using HBM before _ Behavior changes by using HBM After intervention	53	**8.65 ±12.73**	4.077	-13.914	-4.665	-3.489	0.000

The results show that nutritional knowledge mean difference pre-post intervention 10.83 $\pm$32.91 and behavior changes by using health belief model mean difference pre-post intervention is 8.65 $\pm$12.73 positive increase in nutritional knowledge by using HBM results shows that it is also significant (p<0.000). Hence results prove the positive impacts of interventions on diabetic patients and increase the nutritional knowledge after intervention and improve the diet practices of patients.

CHAPTER V: DISCUSSION

Education can be considered as cornerstone for diabetes management, so finding a suitable method to improve self behavior is great importance for type II diabetic patients. The Health Belief Model is a psychological health behavior change model that was developed by social psychologists in 1950 to explain and predict health-related behaviors particularly in regard to the uptake of health services. It is one of the best known and most widely used theories in health behavior research. It suggests that people's beliefs about health problems, perceived benefits, barriers to action, and self-efficacy explain in health-promoting behavior. Preparing individual training session suitable for the all diabetic patients in tertiary care hospitals is one of the necessary principles of this training program as this study tried to present the training session in a such a way that it is suitable according to age and education level of the participants also its easier for them to follow the training session according to their convenience. The results of the present study showed that nutritional education could increase patient's knowledge, physical activity, and improve dietary habits of the current study respondents and reduce their fasting blood glucose. Before the intervention, mean of knowledge scores was in the moderate level. This means that patients see the danger of poor adherence to the diet (the increase of perceived susceptibility) and feel the benefits of adherence to the diet (the increase of perceived benefits), and this makes them follow the diet. As shown by the results of this study participating in the educational program on HBM increased the mean score after one week intervention implementation intervals ($p < 0.05$).

Heidari et al1 reported the grade of 68% in nutritional knowledge of diabetes before intervention, which significantly increased after the intervention. One study in Iran and another in Spain showed a significant increase in the patients' nutritional knowledge. The

components of the health belief model were in the moderate stage in the present study. This means that patients see the danger of poor adherence to the diet (the increase of perceived susceptibility) and feel the benefits of adherence to the diet (the increase of perceived benefits), and this makes them follow the diet. The main benefits of dieting for patients were mentioned as controlling their fasting blood sugar and weight, and lowering the costs of disease.

In a study by Aghamolayee et al., the mean values of the perceived susceptibility, severity, benefits and behavior increased after intervention and the perceived barriers reduced in the respondents. Brekke et al reported that unavailability of healthy food and lacks of healthy recipes in restaurants were barriers of adherence to the diet. Polly et al found a significant relationship between perceived barriers and glycemic control. Vijan et al mentioned the high costs, lifestyle and lack of family support as the barriers of adherence to the diet. Nutritional practice of the patients was poor before the intervention, but after the intervention, it increased significantly. In other studies, also the practice scores increased after educational intervention.

In this study there were 53 diabetic patients and belonged to the adult age group of 25-above 60 years. During the start of the study there were no significant differences between the distributions of demographic variables (p > 0.05). The results of this study showed that there was an increase in the mean scores of nutritional knowledge, perceived susceptibility, perceived benefits, perceived severity, and self-efficacy and also a decrease in the mean score of perceived barriers after the implementation of the education based implementation of HBM model on the study population. As shown by the results of this study participating in the educational program on HBM increased the mean score of perceived susceptibility and perceived severity in the after intervention one week intervals (p < 0.05).

The result of this study showed that a greater proportion of diabetic patients had a poor nutritional knowledge and no self-care routine. These deficiencies arise from lack of awareness about the effect of nutritional education for selection of diet for diabetic patient and need for consultation from any registered dietitian for proper dietary guidance.

The deficiency in the nutritional knowledge of diabetic patients may be due to poor communication between the doctors, dietitian and the patients and also lack of counseling by the doctors, dietitian and nurses as result of busy hospitals schedule. Some lack of coordination found between hospital diabetologist and dietitian for recommendation of modified diet to diabetic patients. Thus, patient nutritional education on the prevention of diabetes future complications is imperative and should be incorporated in to the routine self care of diabetes both in the hospital and in the family. Time must allot to communication, information and nutritional education during clinic session and doctors must refer diabetic patients to hospital dietitian for proper diet instruction.

5.1. Limitations:

Through the study provided some understanding of the effects of Nutritional Education and Health Belief Model for behaviors changing among diabetic patients. Despite the results showing improvement in overall Nutritional knowledge and Health Belief model for positive behavior changes among educated patients and also among those patients which have family history of diabetes. The study was conducted in a limited geographical region of Rawalpindi therefore; findings may not represent the actual nutritional knowledge of diabetic patients in the whole country. Quasi-experimental design/ pre- post non probability purposive sampling used.

5.2. Strengths:

Despite of having the above-mentioned limitations, the study has the following strengths. The study was conducted on a small sample size (N=53) out of two tertiary care hospitals in Rawalpindi, because accuracy of outcome results each patient gave the data before and after the intervention. So, it's easy to check effects of nutritional education on the knowledge of diabetic patients because of small sample size. This study identified significant facts about poor nutritional knowledge and barriers of behaviors changing for dietary patterns about diabetes among patients. A significant majority of them had limited dietary knowledge about diabetes management before intervention implementation but after interventions good positive results show in this study.

CHAPTER VI: CONCLUSION

The educational training intervention by using HBM model showed a significant increase in lifestyle and behaviors changing after intervention. In fact, this enhanced behavior can be attributed to the training method that was used in the study. Our results suggest that educating patients with diabetes based on HBM promotes the self-care behaviors. Therefore, the present study shows the effect of the health belief model in nutrition education. Majority of participants well aware about effects of diet in control of diabetes mellitus after intervention implementation

CHAPTER VII: RECOMMENDATIONS

Policy point of view:

Policies should be made at National level so as to conduct and hold frequent workshops, seminars on job training for health professionals. Diabetes related Nutritional education programs should be organized on a community level to increase the awareness level in adults.

Hospital level:

Every Tertiary care hospital should have Nutrition clinic for proper awareness about dietary intake. People should be encouraged to exercise regularly, and to change their behavior regarding diet and life style modification. Health promotion activities should be organized at primary care level.

Patient/client level:

If diabetic patients can be educated and motivated, then this self -realization can help them in preventing the secondary complications & this can lead to an increase in the level of care among diabetic patients. Nutritionist should provide comprehensive knowledge and awareness about disease future complication and dietary guideline while treating diabetic patients, because it can be helpful for successful management of diabetes. It will also help in reducing the communication gap between nutritionist and patients.

Way forward:

Studies need to be carried out in future on geographically large area and population size. Studies should be carried out in different tehsils and on national level. Within this context, more researches need to be carried out so as to give a clear picture of the current situation, to identify potential problems with a suggestion of possible solutions. In future, researches should also be made so as to investigate the effect of nutritional education on the knowledge of diabetic patients and using HBM for changing behaviors about diet and physical activities. Gaps which are not discussed in this study can be cover by future studies.

REFERENCES

Abraham, A. M., Sudhir, P. M., Philip, M., & Bantwal, G. (2015). Illness perceptions and perceived barriers to self-care in patients with type 2 diabetes mellitus: an exploratory study from India. *International Journal of Diabetes in Developing Countries*, *35*(2), 137-144.

Alameddine, M., Nasreddine, L., Hwalla, N., Mourad, Y., Shoaib, H., Mousa, D., & Naja, F. (2013). Factors associated with consulting a dietitian for diabetes management: a cross-sectional study. *BMC Health Services Research*, *13*(1), 1-10.

Babazadeh, T., Dianatinasab, M., Daemi, A., Nikbakht, H. A., Moradi, F., & Ghaffari-Fam, S. (2017). Association of self-care behaviors and quality of life among patients with type 2 diabetes mellitus: Chaldoran County, Iran. *Diabetes & metabolism journal*, *41*(6), 449-456.

Bayat, F., Shojaeezadeh, D., Baikpour, M., Heshmat, R., Baikpour, M., & Hosseini, M. (2013). The effects of education based on extended health belief model in type 2 diabetic patients: a randomized controlled trial. *Journal of diabetes & Metabolic disorders*, *12*(1), 1-6.

Chawla, A., Chawla, R., & Jaggi, S. (2016). Microvasular and macrovascular complications in diabetes mellitus: distinct or continuum?. *Indian journal of endocrinology and metabolism*, *20*(4), 546.

Cui, Y., Zhang, L., Zhang, M., Yang, X., Zhang, L., Kuang, J., ... & Meng, Q. (2017). Prevalence and causes of low vision and blindness in a Chinese population with type 2 diabetes: the Dongguan Eye Study. *Scientific Reports*, *7*(1), 1-9.

Dadkhah Tehrani, B., Tavakoli, R., & Jazayeri, S. A. (2019). The Effect of an Educational Intervention Based on Health Belief Model on Nutritional Behaviors in Type 2 Diabetics. *Military Caring Sciences Journal*, *5*(4), 303-311.

Davis, R., Campbell, R., Hildon, Z., Hobbs, L., & Michie, S. (2015). Theories of behaviour and behaviour change across the social and behavioural sciences: a scoping review. *Health psychology review*, *9*(3), 323-344.

Dehghani-Tafti, A., Mahmoodabad, S. S. M., Morowatisharifabad, M. A., Ardakani, M. A., Rezaeipandari, H., & Lotfi, M. H. (2015). Determinants of self-care in diabetic patients based on health belief model. *Global journal of health science*, *7*(5), 33.

Dizaji, M. B., Taghdisi, M. H., Solhi, M., Hoseini, S. M., Shafieyan, Z., Qorbani, M., ... & Rezapoor, A. (2014). Effects of educational intervention based on PRECEDE model on self care behaviors and control in patients with type 2 diabetes in 2012. *Journal of Diabetes & Metabolic Disorders*, *13*(1), 1-6.

Einarson, T. R., Acs, A., Ludwig, C., & Panton, U. H. (2018). Economic burden of cardiovascular disease in type 2 diabetes: a systematic review. *Value in Health*, *21*(7), 881-890.

Fatema, K., Hossain, S., Natasha, K., Chowdhury, H. A., Akter, J., Khan, T., & Ali, L. (2017). Knowledge attitude and practice regarding diabetes mellitus among Nondiabetic and diabetic study participants in Bangladesh. *BMC public health*, *17*(1), 1-10.

Firooz, M., Hosseini, S. J., Mazlom, S. R., Hasan Zadeh, F., & Kimiyaee, S. A. (2016). Self-care of patient with diabetes type II. *Journal of Sabzevar University of Medical Sciences*, *22*(6), 1018-1025.

Goff, L. M., Rivas, C., Moore, A., Beckley-Hoelscher, N., Reid, F., & Harding, S. (2021). Healthy Eating and Active Lifestyles for Diabetes (HEAL-D), a culturally tailored self-management education and support program for type 2 diabetes in black-British adults: a randomized controlled feasibility trial. *BMJ Open Diabetes Research and Care*, *9*(1), e002438.

Graziano, J. A., & Gross, C. R. (2009). A randomized controlled trial of an automated telephone intervention to improve glycemic control in type 2 diabetes. *Advances in Nursing Science*, *32*(3), E42-E57.

Hejazi, S., Peyman, N., Tajfard, M., & Esmaily, H. (2017). The impact of education based on self-efficacy theory on health literacy, self-efficacy and self-care behaviors in patients with type 2 diabetes. *Iranian Journal of Health Education and Health Promotion*, *5*(4), 296-303.

Ishak, N. H., Yusoff, S. S. M., Rahman, R. A., & Kadir, A. A. (2017). Diabetes self-care and its associated factors among elderly diabetes in primary care. *Journal of Taibah University Medical Sciences*, *12*(6), 504-511.

Karimy, M., Araban, M., Zareban, I., Taher, M., & Abedi, A. (2016). Determinants of adherence to self-care behavior among women with type 2 diabetes: an explanation based on health belief model. *Medical journal of the Islamic Republic of Iran*, *30*, 368.

Kotsis, V., Tsioufis, K., Antza, C., Seravalle, G., Coca, A., Sierra, C., ... & Grassi, G. (2018). Obesity and cardiovascular risk: a call for action from the European Society of Hypertension Working Group of Obesity, Diabetes and the High-risk Patient and European Association for the Study of Obesity: part B: obesity-induced cardiovascular disease, early prevention strategies and future research directions. *Journal of hypertension*, *36*(7), 1441-1455.

Kumari, S., Laxmikant, S. D., Sonika, B., & Khanal, S. (2022). Efficacy of Integrated Ayurveda treatment protocol in type 2 diabetes mellitus–A case report. *Journal of Ayurveda and Integrative Medicine*, *13*(1), 100512.

Laranjo, L., Neves, A. L., Costa, A., Ribeiro, R. T., Couto, L., & Sá, A. B. (2015). Facilitators, barriers and expectations in the self-management of type 2 diabetes—a qualitative study from Portugal. *European Journal of General Practice*, *21*(2), 103-110.

Mahan, L. K., Escott-Stump, S., & Krause, M. V. (2003). Medical Nutrition Therapy for Metabolic Stress: Sepsis, trauma, Burns and Surgery. *Krause's food, nutrition, & diet therapy. 11th ed. Philadelphia: WB Saunders*, 1058-72.

Namazi, N., Larijani, B., & Azadbakht, L. (2017). Low-carbohydrate-diet score and its association with the risk of diabetes: a systematic review and meta-analysis of cohort studies. *Hormone and Metabolic Research*, *49*(08), 565-571.

Nazir, M. A., AlGhamdi, L., AlKadi, M., AlBeajan, N., AlRashoudi, L., & AlHussan, M. (2018). The burden of diabetes, its oral complications and their prevention and management. *Open access Macedonian journal of medical sciences*, *6*(8), 1545.

Newton, C. A., & Raskin, P. (2004). Diabetic ketoacidosis in type 1 and type 2 diabetes mellitus: clinical and biochemical differences. *Archives of internal medicine*, *164*(17), 1925-1931.

Shabibi, P., Zavareh, M. S. A., Sayehmiri, K., Qorbani, M., Safari, O., Rastegarimehr, B., & Mansourian, M. (2017). Effect of educational intervention based on the Health Belief Model on promoting self-care behaviors of type-2 diabetes patients. *Electronic physician*, *9*(12), 5960.

Shabibi, P., Zavareh, M. S. A., Sayehmiri, K., Qorbani, M., Safari, O., Rastegarimehr, B., & Mansourian, M. (2017). Effect of educational intervention based on the Health Belief Model on promoting self-care behaviors of type-2 diabetes patients. *Electronic physician*, *9*(12), 5960.

Sharifirad, G., Entezari, M. H., Kamran, A., & Azadbakht, L. (2009). The effectiveness of nutritional education on the knowledge of diabetic patients using the health belief model. *Journal of research in medical sciences: the official journal of Isfahan University of Medical Sciences*, *14*(1), 1.

Skamagas, M., Breen, T. L., & LeRoith, D. (2008). Update on diabetes mellitus: prevention, treatment, and association with oral diseases. *Oral diseases*, *14*(2), 105-114.

Solhi, M., Hazrati, S., & Nejaddadgar, N. (2017). Analysis of self-care behaviors and their related factors in patients with type II diabetes. *Journal of Diabetes Nursing*, *5*(3), 223-231.

Toumpanakis, A., Turnbull, T., & Alba-Barba, I. (2018). Effectiveness of plant-based diets in promoting well-being in the management of type 2 diabetes: a systematic review. *BMJ Open Diabetes Research and Care*, *6*(1), e000534.

Vahidi, S. (2015). The effect of an educational program based on the health belief model on self-efficacy among patients with type 2 diabetes referred to the Iranian Diabetes Association in 2014. *Journal of Diabetes Mellitus*, *5*(03), 181.

Verhulst, M. J., Loos, B. G., Gerdes, V. E., & Teeuw, W. J. (2019). Evaluating all potential oral complications of diabetes mellitus. *Frontiers in endocrinology*, *10*, 56.

ANNEXURE 1
Data Collection Tool
Effect of Nutritional Education on the knowledge of Diabetic patients using the Health Belief Model in Rawalpindi city: Quasi experimental study

Date: _____   Client form Number: _____

SECTION A

(DEMOGRAPHICS)

1: Age of respondent _____years

1. 25-35   2. 36- 50   3. 51-64   4. 65 and above

2: Gender

1. Male   2. Female

3: Education level

1. Illiterate   2. Primary school   3. Junior high school

4. High school   5. Higher than diploma

4: Marital status

1. Married   2. Unmarried

5: Smoking history

1. Smoker   2. Nonsmoker

6: Place of residence

1. Urban   2. Rural

7: Employment Status

1. Employed   2. Unemployed

8: Monthly income

1. 20-50K   2. 51-100K   3. More than 100K

9: Family history of diabetes mellitus

1. Yes   2. No

10: Height _____

Current weight _____

BMI _____

1. Underweight (<18.5)   2. Normal weight (18.5-24.9)

3. Overweight (25.0-29.9)   4. Obese ($\geq$ 30.0)

SECTION B

(Nutritional knowledge)

1: What is a good balance diet?

1. that is full of the entire mineral sources   2. Diet having all the essential nutrients

3. Diet I crave for

2: Which of the food group is not good for diabetes patients?

1. Carbohydrates   2. Milk and milk products   3. Fruits and vegetables

3: Which of the foods you think are rich in sugar?

1. Banana   2. Potatoes   3. Whole wheat chapatti   4. All of them

4: Which type of dairy diabetic patients should consume?

1. Full fat milk   2. Reduced fat/ skim milk   3. Do not consume any dairy products

5: As compared to natural food, processed foods are good for diabetes patients

1. Yes   2. No   3. Not sure

6: Which of these dietary behaviors can help diabetic patients to achieve good health?

1. Eating few variety of food   2. Eating a modified balance diet

Weekly Food intakes Habits after and before:

Sr. No	Foods	No intake	1-2 times/week	3-4times/week	More than 4 times/ week
7	Sugary snacks				
8	Canned fruits/ cocktails				
9	Bakery products				
10	Soft drinks and packaged juices				
11	Potatoes				
12	Rice				
13	Fruits				
14	Skimmed Milk				
15	Table sugar/ Gur				
16	Whole wheat chapatti/ paratha				

18: Did anyone counsel you regarding nutritional requirements after diagnosis of diabetes?

1. Yes   2. No

SECTION C

(Health Belief Models Components)

1: Perceived susceptibility

"I do not get diabetes complications"	Agree	Disagree	Don't know
1. Too much table sugar intake can be a major source of diabetes			
2. diabetes is a genetic disease not effected by any type of diet taken			
3. diabetes only control by the insulin not controlled by the diet modification			

2: Perceived severity

"I think that diabetes is a serious disease"	Agree	Disagree	Don't know
1.Diabetes is a disease which is curable with diet management			
2.Specific diet recommended for people with diabetes			
3. Diet and exercise make a difference to your overall health if you have diabetes			
4. Patients of diabetes stay longer in hospital after uncontrolled diabetes condition develop due to not timely cure			

3: Perceived benefits

"Proper diabetic diet is effective for control blood sugar"	Agree	Disagree	Don't know
1. Following diet instruction from, health care provider for diabetes mellitus will keep me from having high blood glucose			
2. My family member always cook my foods according to the instruction given by the health care provider			

3. Regular exercise can prevent me from developing complications of diabetes in my body			
4. Since blood sugar level is an important factor in diabetes treatment therefore I am concerned about my blood sugar level			

4: Perceived barrier

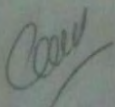| "Diet for diabetics is annoying me"	Agree	Disagree	Don't know
1.In Diabetes recommended diet is taste less			
2. My family members do not encourage me to exercise regularly and follow the diabetic diet plan			
3. My family has no time to prepare separate diabetic modified diet			
4. The cost of the recommended foods to eat according to meal plan is expensive			
5. It need much time to prepare my foods			

5: Perceived self-efficacy

"How you sure the ability to diabetic diet?"	Never	Sometimes	Always
1. I stay on my diet when I eat out			
2. I follow all instructions from the health care for my diet			
3. I always say to myself that exercise is important for me			

ANNEXURE 2
Hospital Permission Letter

I   O   N

Adm-1

Subject: **Permission for Conducting Research in Effect of Nutritional Education -
FFH Rawalpindi**

Miss Rabia Yousaf D/O Muhammad Yousaf directed to report in your Deptt for conducting research project of effect of Nutritional Education in type -2 diabetic patient by using HBM visiting tertiary care hosp without any financial implications on FF.

Trg Officer
(Dr Nighat Parveen)

To: **MO I/CS**
Female Med OPD
Chest OPD
Diabetic Clinic - Friday   Case No. 6034/2/Adm-I   Aug 2022

ANNEXURE 3
Informed Consent Form

I am Rabbia Yousaf, student of MSPH- Final Semester, Al-shifa School of Public Health, Al-shifa Eye Hospital Rawalpindi. I am doing research on Effect of Nutritional Education on the knowledge of Diabetic patients using the Health Belief Model in Rwp & Isb city: quasi experimental design.

PURPOSE OF THE RESEARCH

The purpose of this study is to identify Effect of Nutritional Education on the knowledge of Diabetic patients using the Health Belief Model in Rwp & Isb city: quasi experimental design.

PARTICIPATION

I do not anticipate that taking this study will contain any risk or inconvenience to you. Your participation is strictly voluntary and you may withdraw your participation at any time without penalty. I request you to answer the questions as honestly as possible. It will take no longer than 20 minutes to complete a questionnaire. All information collected will be used only for research purpose and will be kept highly confidential. Your identity and your responses will not be identifiable; all data will be stored anonymously. As this is solely a student project no incentive will be provided. Once study is completed, I would be happy to share the results with you if you desire.

Thank you for agreeing to participate in this study. Your feedback is important.

Consent

I have read and understand the information sheet and agree to take part in the study.

Signature_____ **Date**_____

ANNEXURE 4
IRB Letter

AL-SHIFA SCHOOL OF PUBLIC HEALTH
PAKISTAN INSTITUTE OF OPHTHALMOLOGY
AL-SHIFA TRUST, RAWALPINDI

No. MSPH-IRB/13-33
24th March, 2022

TO WHOM IT MAY CONCERN

This is to certify that Rabbia Yousaf D/O Muhammad Yousaf is a student of Master of Science in Public Health (MSPH) final semester at Al-Shifa School of Public Health, PIO, Al-Shifa Trust Rawalpindi. He/she has to conduct a research project as part of curriculum & compulsory requirement for the award of degree by the Quaid-i-Azam University, Islamabad. His/her research topic which has already been approved by the Institutional Review Board (IRB) is **"Effect of Nutritional education on the knowledge of diabetic patients using the health belief model in Rawalpindi and Islamabad: @ Quasi experimental study".**

Please provide his/her necessary help and support in completion of the research project. Thank you.

Sincerely,

Dr. Ayesha Babar Kawish
Head
School of Public Health, PIO
Al-Shifa Trust, Rawalpindi

ANNEXURE 5
Gantt chart

Activities	March 2022	April 2022	May 2022	June 2022	July 2022	August 2022	September 2022
Literature search	■	■	■	■	■	■	
Synopsis writing and IRB approval	■	■					
Pilot testing		■					
Data collection and entry			■	■			
Data analysis					■		
Write-up					■	■	
Thesis submission							■

ANNEXURE 6
Budget

Budget item	Transport	Stationery and internet	Printing	Publishing
Pilot testing	500 Rs/-	5000 Rs/-	5000 Rs/-	-
Data collection	10,000 Rs/-	7,000 Rs/-	-	-
Thesis write-up	1,000 Rs/-	5,000 Rs/-	8,000 Rs/-	25,000 Rs/-
Total expenditure	16,000 Rs/-	17,000 Rs/-	13,000 Rs/-	25.000 Rs/-
Grand total	71,000 Rs/-			