INTRODUCTION

Non-communicable diseases have spread due to alterations in lifestyle, decreased physical activity, and poor nutrition to the point where they now pose substantial issues and account for a sizable portion of mortality globally.

Chronic diseases, sometimes referred to as non-communicable diseases (NCDs), are characterized by a protracted course and are brought on by a confluence of genetic, physiological, environmental, and behavioral variables. The four primary categories of NCDs are diabetes, cancer, chronic respiratory diseases (including chronic obstructive pulmonary disease and asthma), and cardiovascular disorders (such heart attacks and stroke). These four diseases have four behavioral risk factors in common: poor diet, inactivity, use of tobacco and alcohol, and use of harmful substances.

These illnesses are fueled by variables such as population ageing, increased unplanned urbanization, and globalization of bad lifestyles. Obesity, rising blood lipids, elevated blood glucose, and raised blood pressure are all symptoms of unhealthy diets and insufficient exercise in humans. They are known as metabolic risk factors, and they can result in cardiovascular disease, the NCD that causes the greatest number of untimely deaths.

The percentage of deaths caused by non-communicable diseases (NCDs) in India is thought to have increased from 37.9% in 1990 to 61.8% in 2016, according to the study report published in 2022 "India: Health of the Nation's States"- The India State-Level Disease Burden Initiative from 2017 by the Indian Council of Medical Research (ICMR). The four main NCDs are diabetes, cancer, chronic respiratory diseases (CRDs), and cardiovascular diseases (CVDs).

One of the non-communicable diseases is diabetes. One of the biggest worldwide health crises of the twenty-first century is Diabetes. WHO claims that "Developing countries will age before they become wealthy, whereas industrialized countries became wealthy as they aged." According to estimates, non-communicable diseases will cause one in three deaths, with diabetes being one of the main causes.

In order to depict the sweet taste and aroma of the patient's urine, the Greek prefix mellitus, which means "like honey," was added to the word diabetes in 1675, a rare and unrelated condition. Madhumeha is the name for a condition in Ayurveda where a person passes urine that tastes like honey (Hyperglycemia). The contributing reasons to hyperglycemia are decreased insulin sensitivity and production.

In India, increasing older population is a result of improved diagnostic and treatment capabilities, better healthcare facilities, and increased awareness. As this population group grows, the burden of illness and, consequently, the cost of healthcare for each person also grows. This demographic is disregarded over the world more and more as people get older. The main elements in lowering the illness burden are an accurate assessment of their issues, a right diagnosis, and appropriate therapy. This improves the patients' quality of life, which is extremely important.

Because of increased longevity and lifestyle changes, Diabetes Mellitus (DM) is a global issue that is getting worse. Elderly people experience diabetes mellitus problems and comorbidities more frequently than young people. Age-related decline in insulin production, genetic predisposition, and long life expectancy are a few of the variables that contribute to the development of diabetes in the elderly. As people get older (60–65 years old), DM is becoming a serious public health issue in established and even developing nations. According to Chentli et al., 2015, one in two older people are diabetic or prediabetic, and eight out of ten older people have some form of dysglycemia.

According to estimates, 77 million Indians over the age of 18 have type 2 diabetes, and over 25 million are prediabetics (at a higher risk of developing diabetes in near future). More than 50% of people do not know they have diabetes, which can cause serious health problems if not caught early and managed. People with diabetes are two to three times more likely to experience a heart attack or stroke. Neuropathy (nerve damage) in the feet raises the risk of foot ulcers, infection, and ultimately the requirement for limb amputation when combined with decreased blood flow. Many factors can either negatively or positively impact QoL in DM management. Age, gender, marital status, family structure, occupation, retirement, low

socioeconomic status, lower educational status, strict dietary and exercise regimen adherence, type of diabetes, insulin use, microvascular and macrovascular complications, longer duration of illness, comorbidities, blood glucose level, glycated haemoglobin (HbA1C), and type of treatment are all factors that should be taken into consideration (Gupta et al., 2021).

The patient and his primary care takers should receive education regarding the importance of proper glycemic management, treatment compliance, and regular exercise to maintain ideal body measurement parameters. Individualized treatment should take into account the patient's preferences, psychological needs, and social circumstances. The use of numerous and complicated medication regimens should be minimized. Individuals in their sixth decade and older should receive a full evaluation and education taking into account their level of physical fitness and any comorbidities.

Older adults with diabetes have a variety of alternatives for managing their condition, including dietary changes, exercise, medication, insulin, and lifestyle changes. Use of botanical products or functional foods is one of the pharmacological methods of blood sugar regulation that can be tested.

One of the key components of managing type 2 diabetes is medical nutrition therapy (MNT). Medical Nutrition Therapy process may have been overlooked when considering the therapeutic and medicinal characteristics of foods, which could improve the efficiency of type 2 diabetes dietary control. Japan deserves credit for popularizing functional meals. In order to promote the health of the ageing population in Japan in the 1980s, the Ministry of Health and Welfare developed a class of "functional foods" with established health advantages above and beyond those provided by basic nutrition.

Consuming functional foods can lower the risk of acquiring diseases in addition to lifestyle modifications and the use of dietary supplements. "A food can be regarded as 'functional' if it is satisfactorily demonstrated to affect beneficially one or more target functions in the body, beyond adequate nutritional effects, in a way that is relevant to either an improved state of health and well-being and/or reduction of risk of disease," according to the definition of 'functional food'. (Diplock A.T.,

1999).

The market for functional foods and nutraceuticals is growing as consumers become more aware of the possible health benefits of food for illness prevention and health enhancement. Functional foods are medical foods that offer additional health benefits to those required on a daily basis. Functional foods contain a physiologically active component that may help with health and illness prevention. Growing consumer demand for functional foods is also assisting farmers in diversifying their agricultural practices, which encourages research and innovation, particularly in poorer nations like India, there is a need to generate evidence for unexplored functional foods.

It is known that eating a diet heavy in fruits, vegetables, and whole grains lowers the chance of developing type 2 diabetes (T2D). When these items are eaten as whole foods, the health advantages that can be derived from them may be maximized. Whole foods include all of the food's components, even the parts that are rarely eaten, like the stems, peels, and seeds. Some underutilized components have antidiabetic properties (Wang S et al., 2016). Additionally, they pointed out that due to the potential for synergistic interactions between the numerous bioactive components, diversified food diets rather than those that only contain one or two components offer a potent method to combat human diseases. The bioactive substances in these foods alter the metabolism of glucose through a number of different mechanisms, including inhibition of carbohydrate digestion and glucose absorption in the intestine, stimulation of insulin secretion from pancreatic â-cells, modification of glucose release from the liver, activation of insulin receptors, glucose uptake in the insulin-sensitive tissues, and modification of hepatic glucose output. Thus, Fruits, vegetables, spices, cereal grains, legumes, and other whole foods and their by-products are all examples of anti-diabetic functional foods. These foods are healthy, inexpensive, and safe, making them a good alternative for managing the disease.

Vegetables, one of several food crops, are a crucial component of the diet and offer a variety of nutrients, including carbs, vitamins, minerals, and fibre. The combined effects of oxygen scavengers like calcium, fibre, and beta-carotene, which are found in vegetables, lower the risk of cancer, heart disease, and early ageing. Due

to its nutritional and therapeutic benefits, pumpkin is one of the most significant vegetable crops grown today (Abd EI-Aziz, 2011).

Pumpkin, which is a member of the Cucurbitaceae family and the genus Cucurbita, is also referred to as kaddu, kadhu, sitaphal, and kashiphal in India. According to Jeffrey's most recent classification, it has 825 species and 118 genera.

These are widely used for thanksgiving dinners and Halloween carvings in the USA. There are several pumpkin-related items on the market, including pumpkin seed oil, pumpkin extracts, pumpkin seeds, pumpkin seed proteins, and concentrated pumpkin paste. In India, mostly it is found to be used in festivals and on fasting days.

Scientifically, Pumpkin is frequently used to treat a variety of illnesses, including antidiabetic, antihypertensive, anticancer, antibacterial, anti hypercholesterolemia, intestinal antiparasitic, and anti-inflammation, in several traditional medical systems. Pumpkin also contains polysaccharides, para-aminobenzoic acid, lipids, sterol, proteins, and peptides, which are biologically similar substances.

Pumpkin seeds, commonly known as pepitas, are small, flat, green, and have a nutty flavour. Most pumpkin seeds have a white husk, however some cultivars may yield seeds without it.

The seeds of the pumpkin also contain significant amounts of magnesium and iron in addition to high concentrations of zinc, phosphorus, potassium, selenium, manganese, and copper. Moreover, it contains significant amounts of politic, stearic, oleic, and linoleic acids (Nakic SN, 2006).

Because pumpkin seed oil has several health benefits, including antioxidant, anti-inflammation, antidiabetic, anti-cancer, anti-cardiovascular, anti-hyperlipidemia, and estrogenic like effect, researchers have thus far concentrated primarily on fatty acids, phytoestrogens, and tocopherol. The significant content of unsaturated fatty acids in pumpkin seed oil also makes it suitable for enhancing the nutritional value of foods (Revathy et al., 2013).

Many people believe that pumpkin seeds have hypoglycemic qualities. Significant

anti-diabetic effects are produced by cucurbita maxima seed extract in regulating blood sugar levels. The seed's potential as an antidiabetic agent is explained by the presence of phenols, flavonoids, or saponins in the seed (Sharma et al. 2013).

The reduction of hyperglycemia and enhancement of acute insulin secretion and insulin sensitivity by polyphenols have been demonstrated in a variety of animal models and a small number of human studies. Activation of insulin receptors and glucose uptake in insulin-sensitive tissues, inhibition of carbohydrate digestion, stimulation of insulin secretion, modulation of glucose release from the liver, decreased intestinal glucose absorption, activation of insulin receptors, inhibition of intracellular signalling pathways, and gene expression are some of the potential mechanisms (Aryaeian et al. 2017).

Pumpkin seeds are a fantastic natural source of important vitamins and minerals, healthful lipids, and fibre, yet they are often thrown out as agricultural waste. Pumpkin seeds are loaded with vitamins, minerals, and amino acids and can be boiled, baked, or even eaten raw. Due to the nutritious nature of pumpkin seeds and its advantages for health, pumpkin has received a lot of attention recently.

Pumpkin seeds have the potential to gain a fresh, emergent market share in the food snack sector as a result of growing public knowledge of agriculture. Pumpkin seeds have the potential to be developed into a novel cuisine, and they can be added to many products to help decrease food waste.

Although there is a significant amount of knowledge on the health benefits of pumpkin seeds, there is still plenty of opportunity to uncover these seeds' undiscovered qualities, particularly through human trials. Using this underutilized agricultural product will help to maximize the use of the resources that are already accessible.

The components of cucurbita maxima seed and pulp extracts may have a variety of health-improving qualities, bringing up new opportunities for the therapeutic application of natural products. The results of the study demonstrated that C. Maxima can serve as a significant raw material for drug development in the pharmaceutical sectors due to the presence of many phytochemicals, including alkaloids, flavonoids, phenols, carbohydrates, tannins, saponins, terpenoids, and

proteins (Muchirah et al., 2018).

Since diabetes is a disease that is strongly tied to unhealthy lifestyles, changing one's way of life should be the first step in managing the condition effectively. The stability and sustainability of these effects are frequently low, despite the possibility that numerous pharmacological interventions may be linked to changes in obesity and diabetes. There are various non-pharmacological treatments available to control blood glucose levels among diabetic population. The constituents of pumpkin seeds have several health medicinal properties which lead to opening up new avenues in the use of natural products for therapeutic purpose. Pumpkin seeds are generally discarded as waste but they can play important role in food by nutritional aspect. They can be consumed regularly without causing any side effects on human health. There is also a dearth of information on dosage in human studies.

Pumpkin seeds have potential to be developed as novel food and it can be added to various products which can reduce the wastage of the pumpkin seed. Even though there is sizable quantum of information available with regards to beneficial effect of pumpkin seeds, still there is an ample scope to expose unknown properties of these seeds especially on human trials. The usage of such underutilized agricultural product will help to maximize available resources. Sensitization regarding health benefits of pumpkin seeds among old age population will help to reduce diabetes to some extent and will help to improve quality of life.

By keeping this rationale in mind, present study was planned specifically on old age (above 60 years) diabetic population of urban Vadodara with following major objectives:

- To carry out nutrient profiling of pumpkin seeds
- To develop 8 eqi carbohydrate pumpkin seed incorporated recipes at different dosage.
- To conduct sensory evaluation of the developed recipes
- To assess glycemic index and satiety index of pumpkin seed incorporated recipes
- To evaluate impact of pumpkin seed supplementation on glycemic and lipemic

parameters of type 2 diabetic old age population of urban Vadodara.

Based on this background introduction and objectives about the study, reviews on relevant topics are discussed in the next chapter.