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# DIABETIC NEUROPATHY, SELF CARE AND PAIN MANAGEMENT.



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### Abstract

Diabetes pain management is an important aspect of reducing suffering from those affected by the disease. Millions of people of all ages across the world live and endure varying degrees of pain caused by diabetes neuropathy and its related complications. In the research, the details on diabetes self-management have been widely emphasized. This includes a number of mechanisms on self-care activities. Another critical point is on the management of foot ulcers. Likewise, the other areas highlighted include the focus on the general meaning of diabetic neuropathies, how it affects the nerves, and the extent of how it causes pain and finally debilitating a patient if a tight control of blood sugar level is not followed. Various types of diabetic neuropathies have also been mentioned, as well as various methods of controlling and easing the pain, although pain management is a really wide topic, a general method of management has been mentioned. The patient education that can guide a diabetic patient into following and adjusting to certain lifestyles are discussed. The aim of this project is to publish a book to educate the public into understanding ways of minimizing pain caused by diabetes and its related complications, and how to care for themselves.

**KEYWORDS:** Pain, diabetes, diabetes neuropathy, self-management, foot ulcers, ways pain reduction

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## LIST OF ABBREVIATIONS (OR) SYMBOLS

ADA- American Diabetes Association

CDCP- Centre for Diseases' Control & Prevention

DFU- Diabetic foot ulcer

DSME- Diabetes self-management education

FDA- Finnish Diabetes Association

GI- Glycemic Index

IASP- International Association for the Study of Pain

PMH- Pub Med Health

TCCs-Total contact casts

WHO- World Health Organization

IDDM- Insulin dependent diabetes Mellitus

NIDDM- Non-Insulin Dependent Diabetes Mellitus

CAN- Cardiovascular Autonomic Neuropathy

## 1. INTRODUCTION.

Diabetes is a very common and progressive long-term condition, which places a significant burden of self-management on the individual. The occurrence of all types of diabetes is increasing, with type 2 diabetes growing at an epidemic percentage. The total number of people with diabetes worldwide is estimated to increase from 171 million in 2000 to 366 million in 2030. ( World Health Organization 2010.) Self-management of diabetes is a complex behavioral and social process, requiring not only a comprehensive understanding of the condition but also high levels of self-efficacy, perceived control and empowerment. Unfortunately, having diabetes can negatively impact the quality of life for people living with this condition. (Carole et al. 2007, 25). A considerable number of studies have found relatively high levels of distress, and, in a substantial minority, significant depressive symptoms. The onset of complications, for instance, retinopathy, neuropathy, kidney damage, heart disease and stroke can exacerbate the psychological impact of this progressive condition. (Christel & Frans 2012.)

The association between diabetes and psychological burden that one problem is solved worsening the other and leads back to the original problem. Hence, we need to identify ways to reduce this burden. In order to understand the psychological health and well-being of people with diabetes, more research is needed to establish a greater understanding of perceptions and misconceptions among people with diabetes, their health beliefs and the personal values which inform their self-management.(Centre for Diseases' Control & Prevention 2011.)

Similar research has been carried out in most parts in the US and Europe, with very little being conducted in Australia. A cross-national study, which included an Australian sample, pointed out the importance of a positive and collaborative relationship between health care providers and people with diabetes as well as the relatively high prevalence of diabetes elated distress amongst people with diabetes, and the role of psychological and social barriers to self-care and medication initiation and management. (Jane, Elizabeth & Jessica, 2012.)

## **2. AIM AND TASK.**

The main aim of this thesis project is to produce information about pain management in diabetes.

The task is to publish the thesis in a book format, for public use in the Library.

### **3. EMPIRICAL IMPLICATIONS.**

Diabetes is a chronic illness affecting millions of people worldwide. The subject of pain management associated with this condition has been of great concern to the nurses and other caregivers (American Diabetes Association 2010). The pain ranges from acute to chronic and requires continuing medical care and ongoing patient self-management education and support to prevent acute complications and to reduce the risk of long-term complications. (Jane, Elizabeth & Jessica, 2012.)

Pain has revealed by various studies interferes with self-management activities, sleep, physical functioning, work, family relationships, mood, and quality of life. To make matters worse, pain is often invisible to others, so family members, co-workers, and health-care professionals often have no idea what a person in pain is going through (Sarah, Michelle & John 2005). Many studies have called for further comprehensive research on ways of alleviating pain and proper pain management structures. The significance of the project is to produce information to help the public understand ways of controlling pain. Web-pages have currently been a very significant tool of publishing information to reach the concerned target population due to its easy accessibility. (International Association for the Study of Pain 2010.)

#### **3.1 Search words**

The method of the literature review culminated from a comprehensive search obtained from relevant primary sources and the interpretations of previous literature research. The search identified 2,234 citations, the titles and abstracts of which were reviewed by authors for relevance, resulting in 463 articles. All of these articles were further reviewed in their entirety, and of these, writers identified 20 relevant articles. Each of these articles was rated by authors according to the agreed criteria for the classification of nursing articles and recommendations were linked to the strength of evidence and to effect size of the intervention.



Disagreements regarding classification were arbitrated by a third reviewer. Articles were included if they dealt with the diabetic pain and described it's the management clearly, reported the completion rate of the study, and defined the outcome measures clearly. The researchers also considered the types of diabetes pain, assessment and age groups. The duration was between 2005 to the current articles. Case reports and review articles were also included. We anticipated that studies would use varying measures for quantifying pain reduction. The major databases accessed were the CINAHL, EB-SCO, SCIENCE DIRECT, MEDLINE, Elsevier, Pub Med, Ovid and SAGE JOURNALS and e-books, BOOKS, and also web pages. The search words used were a pain, pain management, self-management, treatment, assessment, diabetes, diabetic pain, diabetes mellitus and peripheral neuropathic pain.

### **3.2 Creating web pages**

Web pages are among the leading sources of finding information in this era. This is due to the fact that they are easily accessible to many people. Following this reason, creating a web page for the project would be a significant factor for it will reach out to the targeted population who may have difficulty finding it from other sources.

In creating this web page, the content of the web page is well structured and the hierarchy of information is perfectly clear for clarity purpose, background color does not interrupt with the text and the text is big enough to read. It is written in simple and clear language as some of the members of the target population may not be well educated or have no education in the health field.

According to there are various factors which can contribute to the visibility of a web page in a search engine result list, for example, web page metadata structure, web page content, hyperlink cited status, search question expansion, and other possible factors. Efforts were made to ensure that all the directives are proven, tested and trusted directives from the academic database.

During the design of the web page, comfortability of the users is made a priority at the back of the mind. Apparently, a web page designer cannot control an internet searcher's behavior and cannot change web page hyperlink status. Navi-

gation buttons and bars were made easy to understand and use. These buttons and bars appear by the left side of every page and it is consistent throughout web pages. Real life picture is not posted on the web page to avoid violating the law of privacy.

## 4. PAIN AND DIABETES PAIN TREATMENT

Pain affects millions of people with diabetes. According to International Association for the Study of Pain (IASP 2008), pain is described as; “an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage”. Quite a greater number of the people having diabetes is known to go through the chronic pain, this means it is persisting in a period of more than six months, experienced daily and of moderate to severe intensity, or that significantly interferes with daily chores. In some cases, a person's pain is clearly related to complications of diabetes in other cases, it is not. Regardless of the cause, however, studies show that chronic pain makes diabetes self-management much more difficult and often leads to higher blood glucose levels. (William & Morley 2012, 11.)

Particularly, the types of pain being expressed by people suffering from diabetes are back pain and neuropathy pain in the feet or hands. The peripheral neuropathy, or nerve damage in the feet and hands, is a prevalent complication. Headaches and other pain sites are also frequently described. A number of people with diabetes also have arthritis, fibromyalgia. This is an arthritis-related illness that causes widespread muscle and joint pain and fatigue or other painful conditions Pain has been revealed to be hindering with self-management activities, sleep, physical functioning, work, family relationships, mood, and quality of life. Pain is often invisible to others, In this case, it aggravates the situation as family members, co-workers, and health-care professionals often have no idea what a person in pain is going through. Several people feel that their physicians do not get to realize it and tell them they should just have to live with it. . (William & Morley 2012, 8.)

## 4.1 Acute and chronic pain

In expressing pain, it is essential to understand the difference between acute and chronic pain. Acute pain is pain that comes on quickly, can be severe, but lasts a relatively shorter period of time. It is the body's natural reaction to injury. Acute pain is a lifesaver. The absence of it can be dangerous in that one has to be cautious all the time to keep from injuring or leading to death accidentally. In this case, people with diabetes are instructed to check their feet visually or manually every day: If an individual has peripheral neuropathy, specifically that causes numbness in the feet, the acute pain nerves in the feet may not be working and if not the person will know about injuries or other, normally painful foot problems. (Lilley., et al 2011, 4.)

Chronic pain is different from acute pain. Chronic pain is defined as “any pain that persists beyond the anticipated time of healing.” IASP 2010. It may have started with an injury, and does not necessarily reflect any injury going on at the moment. Occasionally, there is ongoing inflammation or irritation, and at times not, while, in chronic pain, the nervous system amplifies pain signals or misinterprets sensations as being much worse than they are. According to American Diabetes Association 2010, chronic pain is roughly not a physical thing. Observed from brain mapping, chronic pain uses very different nerve paths from acute pain. Actually, the brain maps of chronic pain appear as the brain maps of intense emotions like anger, or sadness, or fear. (Maryland Board of Nursing 2011, 77.)

In comparison, pain is generated by the brain from all kinds of input. The actual signals from nerve endings are part of the input. But those signals get blended with other sense signals and with thoughts, feelings, and memories. Then the brain organizes all this data and tries to make sense of it. It suggests that pain is a summary of all the data that come into your brain from your whole body, your environment, your relationships, feelings, and beliefs. Chronic pain is a whole body-mind experience. It always has a physical component, and it always

has an emotional component, and there may be other factors as well. (Birch-enall & Adams 2011, 16.)

## **4.2 Causes of chronic pain**

Chronic pain can echo an injury that is yet to heal completely. Regularly, it is caused by nerves that have become oversensitive or by a brain that is misreading the signals it receives. In case acute pain continues for a period of time, nerves and brain may become exhausted of the constant signals and conclude the injury is permanent. Due to this, it necessary to cure acute pain seriously. For instance, people with diabetes in case of foot or back injury without prompt medical attention with adequate rest, other first-aid measures, and seeing a doctor if the pain is severe or persists, mild pain can become severe, and acute pain can become chronic. (American Pain Society, 2009.)

A good way to understand the many causes of chronic pain is by considering phantom limb pain. When people lose an arm or leg in an accident or surgery, about half of them will still feel that the limb is there. About half of those people develop serious pain in the phantom limb. Obviously, this isn't due to physical injury going on in the moment. It's a misunderstanding by the brain of the signals it is getting and not getting. The brain figures the signals add up to something seriously wrong, so it sends out an urgent pain message. The same thing applies to the chronic back and leg pain. (International Association for the Study of Pain (IASP). 2010.)

Anything that makes nerves more sensitive can increase pain. Feelings of stress, fear, helplessness, or anger can increase pain sensitivity. Trauma - such as a physical injury or psychological or sexual abuse - often leads to chronic pain later on. In a study of people with traumatic injuries conducted by researchers at the University of Washington in Seattle, nearly 63% had severe pain one year later. This shows that trauma causes nerves to become oversensitive as a way of trying to prevent further injury. Chronic pain creates several

vicious cycles. For one, people tend to tense their muscles in response to pain, which often makes the pain worse. Pain also leads people to stop moving, which leads to increasing stiffness and more pain. Pain can interfere with sleep, and restless nights can increase pain. Pain also can contribute to depression and painful emotions such as anger, grief, fear, and frustration, which in turn contribute to pain. (Lilley et al. 2011.)

## 5. DIABETIC NEUROPATHY

This is damaging the nerve, caused by mainly having high uncontrolled sugar levels in the blood especially for a lengthy time in diabetic patients. This can be prevented by tightly controlling high blood sugar and maintaining a healthy lifestyle. High glucose levels in the blood usually inflame and harms the nerves all over the body, though more prominent on the feet's and hands. (Boyco et al. 2008.)

Usually, symptoms surface as to where the affected nerve is located in the body. They symptoms of diabetic neuropathy normally vary from pain and numbness in hands and feet terminals to problems with digestive system, urinary tract, blood vessels and heart. Diabetic symptoms differ from individual to individual, some have mild symptoms while others have very severe symptoms which can cause disability and eventually death. (World Health Organisation press. 2010.)

For a clear diagnosis of where the neuropathy has occurred, we have many diagnosis methods, like diagnosis focusing on symptoms only, signs and symptoms, electromyography/nerve conduction studies (EMG/NCS), or composite parameters. When nerves fiber is exposed to blood glucose for a long period of time, it gets damaged, and this will cause diabetic pain or neuropathy. It's not known why this happens but it's thought to be due to complex interaction of blood and blood vessels. This makes the nerves not able to deliver signals, weakens tiny blood vessels walls mostly the capillaries which help oxygenate and nourish the nerves. When the nerve is injured by the autoimmune system, by being attacked wrongly, thinking it is a foreign substance. Also genetic materials which are not related to diabetes can make a patient more prone to damage to the nerve. Smoking, alcohol abuse, and drug abuse markedly damages the nerves and causes inflammation. (Canani. 2015.)

Tight control of high levels of blood sugar is the main factor of delaying the appearance of neuropathy symptoms and slowing progression. A 5-year research for diabetic control and complications showed through insulin dependent

diabetes mellitus therapy lowered neuropathy symptoms by 60%. (Diabetic Control and Complications Trial Research Group. 2009.)

Diabetes Mellitus is the highest cause of neuropathy in the western world, with about 12 million patients with non-insulin dependent diabetic Mellitus, while in the in the USA, there is estimated 1 million patients with insulin dependent diabetes mellitus, while 20% of geriatrics over 65 years old, have DM. It's estimated that 2018 and beyond, the percentage could reach 30. Neuropathy develops in both non-insulin dependent diabetic Mellitus (NIDDM) and insulin dependent diabetes mellitus (IDDM) patients, with a probability of occurrence soon after diagnosis in non-insulin dependent diabetes. (Lin & Quan. 2011.)

A diverse method of detection for neuropathy in patients was used and found 66% of diabetic patients had various forms of neuropathy. (Dyck et al. 2003.) About 8% already had neuropathy when diabetes mellitus was diagnosed, while 50% had it after 25 years of diagnosis. The most prevailing form of neuropathy being polyneuropathy, at 54% in IDDM, and 45% in NIDDM. Focal neuropathy was reported to be 25%. This neuropathy was found to be often without any symptoms. (Balbito. 2012.)

It was also found out that 2% of diabetic children have neuropathy (Thomas & Tomlinson. 2003). The prevalence getting higher with time. A wide American study was done and found 47% patients having peripheral neuropathy, with a 7.5% having polyneuropathy, (Dyck et al. 2009). About 55% were found to have distal symmetric polyneuropathy. Prevalent syndromes, for example, carpal tunnel syndrome had 14-30% prevalence, while radiculopathies / plexopathies, and cranial neuropathies 10%, (Shaw & Zimmet. 2006). Although viable results for the latter 2 less-common syndromes was unavailable. The big difference in diabetic polyneuropathy results is caused by the unavailability, of the same diagnostic protocol, and conflicting ways for selection of methods used to select patients for research, and different tools used for diagnosis. In addition, many patients who had neuropathy did not show any symptoms. To detect neuropathy, thorough and intense neurologic examination by the primary care clinician is paramount. Using different tools for diagnosing methods is important



because it will give better values, an example in quantitative sensory or autonomic testing. (Dyck & O'Brien. 2008.)

A study was done to 4400 Belgian patients, (Pirart et al. 2007) which found out that 7.5% of patients suffered neuropathy already after diabetes diagnosis was done, the number rising to 45%, 25 years later. In hospital population taken in the diabetic clinics, United Kingdom found 29% patients having neuropathy. (Young et al. 2005.)

Minority races like the Hispanics and the African Americans had complications which had advanced and led to legs and feet's being amputated, due to diabetic neuropathy, which was also the main reason for their hospitalization. (Dorsey & Eberhardt. 2006.)

Diabetic neuropathy is diagnosed in both male and female though the males are found with the symptoms earlier than the female while the females suffer more from the symptoms than the male. Diabetic Neuropathy can be found in any age group, but the geriatrics are found to present with more complications. Paediatrics has a high prevalence of type 1 diabetes with a difference to an extent in the rate of diagnosis, and the probability of recovery in children. (Aberg et al. 2004.)

## **5.1 Anatomy of nerves and classifications of neuropathy**

I found it important to research about the nervous system for easy understanding of the neuropathy symptoms and classification in diabetes. I found out three main classifications, peripheral, somatic and autonomic. Autonomic is subdivided into sympathetic and parasympathetic.

The peripheral nervous system has an estimate over 100 billion nerve cells found all over the body intertwined with each other. It connects the brain to the other part of the body, they are grouped in bundles and covered by many layers of fatty tissue known as myelin thus forming the myelin sheath. The myelin sheath helps fasten the nerve impulses along the nerve fibre. The speed of the nerve impulse will depend on the diameter and the amount of the sheath which

covers it. The peripheral nervous system consists of nerve bundles for the somatic and the autonomic nervous system. (Young et al. 2005.)

Somatic nervous system, are nerves from the brain and spinal cord and are controlled by muscles at its own will. It's also known as voluntary effort or skeletal muscles. It also has sensory receptors found in the skin. These sensory receptors are specialized ending of the nerve fibre which gets information all over the body from inside and outside. (Dyck et al. 2003.)

The autonomic nervous systems have its nerves running from the brain stem to the spinal cord and finally the internal organs. This does not require voluntary impulses and mostly does functions we are not aware of, such as heart beating, digestion, blood circulation, hormonal regulations and many more. Autonomic nervous system is further divided into the sympathetic nervous system, which works by helping the body get ready for stressful or emergency situation for example when to fight or when to run away. The other division is parasympathetic, which helps in maintaining the body function in order during normal body situations. This nervous system normally working together and complimenting each other by activating and inhibiting the internal organs work. A good example is sympathetic will raise the blood pressure, pulse rate and breathing rate during an emergency situation, while parasympathetic will reduce them during the normal situation. (Lorenzon. 2002.)

## **5.2 Cranial and spinal nerves**

Peripheral neurons can be categorized broadly as motor, sensory, or autonomic. There are 12 cranial nerves connecting the brain with the eyes, ears, nose, and some parts of the throat, neck and torso. There are 31 spinal nerves which are found along the length of the spinal cord, connecting the spinal cord with other parts of the body. There is an exchange of motor and sensory nerve impulses between the head and the spinal cord all through various body parts.

They work in both autonomic and somatic segments of the peripheral nervous system. Each nerve comes out as two short branches called spinal nerve root,

one found in front of the spinal cord and is also known as the motor or anterior nerve. The posterior or sensory nerve is found at the back of the spinal cord. Motor nerves always deliver impulses from the brain to the rest of the body, while the sensory carry information from the body to the spinal cord and the brain. For example, the position of the body, light, hunger, pain, cold, heat and many more.

Each sensory and motor nerve root found in the sensory fibers relays information from specific body parts, and they join eventually after leaving the spinal cord to form a one spinal nerve plexus. Brachial plexus works by dividing and combining nerve fibers travelling to lower extremities of the feet's and legs. (Steven & Goldman. 2004.)

### **5.3 Classifications of Neuropathies and their symptoms**

Diabetic neuropathy doesn't have a specific part of the body it affects, thus, the damage is found anywhere a nerve exists, example feet eyes, heart, stomach, bladder, and hands. The pain is quite intense that a patient would seek for cold surfaces like ice packs, seeking for relief, (Thomas & Tomlinson. 2003.)

In diabetes type 1, if a patient doesn't control the high level of blood sugar level, he may have no symptoms of neuropathy for a long time while, in type 2 with the same condition, the neuropathy symptoms progress faster. These patients will already be having neuropathy during diagnosis. (Tuomilehto. 2002.)

Diabetic pain can occur at peripheral nerves causing broad symptoms in the sensory, motor, and autonomic. Therefore below is a classification of diabetic neuropathy for ease of screening the patients. This is done by the symptoms presented by the patient. Signs and symptoms are different depending with the nerve which has been affected. The symptoms include pain, change in temperature and loss of sensations, which affects feet and toes mostly.

As mentioned earlier, sensory neurons are normally found outside the spinal cord and have the same path with the specific motor neurons. They are divided according to the specific area accordingly. Sensory neuropathy is slow during

onset but really harmful eventually. It affects the distal extremities example the feet and hands with a glove-stockings design. It can also present with a tingling or burning feeling, piercing pain which is always worse at night, and hypersensitive pain that a bed sheet covered on the affected area can be traumatizing. This normally leads to complications such as weakening of the muscles, foot ulcers, infections, bone and joint pain. (Shaw & Zimmet. 2006.)

Sensory symptoms can be found all over the body or only in one specific area. They can be negative or positive. Negative sensory symptoms include feelings of numbness or deadness, which patients may describe as being the same as wearing gloves or socks. Loss of balance, especially with the eyes closed, and painless injuries due to loss of sensation are common, positive sensory symptoms include burning, sharp tenderness, tingling, electric shock-like sensations, pain, tightness, or high sensitivity when touching (Gourmand. 2007).

This neurons origin is from the central nervous system and edge of the spinal cord, from here, they leave the spinal cord to join lumbar plexus and finally to their specific organ via the peripheral nerves. The neuropathy associated with motor symptoms affect hand and feet, causing weakness, examples are fine hand coordination such as holding a spoon, writing, or trying to open a door. A trembling leg or a patient missing one step all the time is an early symptom. Others include difficulty in raising hands, difficulty in standing up when seated or climbing stairs.

The prevalent symptom, in this case, is a weakness of the toes and feet, if weakness is severe, it could be a differential diagnosis and investigation is paramount for diagnosis such as demyelinating polyradiculoneuropathy, vasculitis. Motor and sensory neuropathy symptoms may be present in a patient at the same time.(Moore. 2003.)

Neurons in this category are mainly from the sympathetic and the parasympathetic system. In the periphery, preganglionic fibers exit the central nervous system and exchange information on postganglionic neurons in the sympathetic chain or in sympathetic ganglia. Normally the tiny nerve fibers are affected first and with more exposure of uncontrolled blood sugar exposure, this continues to

the large fibers. Autonomic neuropathy mostly affects the internal organs such as heart, skin and sweat glands, digestive system, genitourinary system. If a patient has above symptoms, he will have breathing problems, easily falls when standing, and the muscles fails to coordinate as well. Also present is problems in the gastrointestinal tract, heart, urinary track or sudomotor. (Johnson & Vinik. 2008.)

When diabetic neuropathy affects the digestive system, it presents with the following symptoms, malabsorption, pain, fecal incontinence, constipation, nausea and vomiting, and difficulty in swallowing. If it affects the heart, it presents with sinus tachycardia, sinus arrhythmia, which is hard to treat, decreased heart beats even when the patient is breathing deeply, near loss of breath when changing positions from sitting or sleeping or standing, due to a slow change in blood pressure. (Meirer. 2003.)

Urine bladder neuropathy can easily be confused with other symptoms like problems affecting the prostate or spine. It presents with an inability to urinate, feeling of an incomplete bladder emptying, straining to urinate. If sudomotor is affected, it may have symptoms affecting heat and cold sensations such as heat intolerance, heavy sweating of head, neck, and trunk with anhydrases of lower trunk and extremities, gustatory sweating. (Ziegler. 2009.)

The autonomic nervous system also works by controlling the smelling ability, reproduction, stomach, and neuropathy attacks these areas as well. Sometimes this can make the body not recognize when the blood sugar is high or low, and can be dangerous. It also makes the body not recognize when the bladder is full, thus, incontinence or infections, other lack of sensory disorders are constipation, uncontrolled diarrhoea, constipation, gastroparesis which is when the tummy takes a lag in defecation, causing nausea and vomiting and the patient loses appetite. When it affects the nerves found in the throat, the patient may have difficulty in swallowing. (Smith et al. 2006.)

The reproductive organs are affected by erection dysfunction, sexual difficulties in females among them vaginal dryness in females. There is also increased or decreased sweating of the body. In the circulatory system, the body

may fail regulate its body temperature, or blood pressure, leading to a drop of in blood pressure which may make the patient feel dizzy or faint also known or increases heart rate when one is asleep. The eyes may be affected by problems with adjusting from dark to light, and may cause blurred vision. ( Pirart. 1978.)

At some level, autonomic neuropathy is found mostly in patients who have distal symmetrical diabetic polyneuropathy. Autonomic problems may go unnoticed by the patient and total autonomic is seldom (Singh. 2005.)

Radiculoplexus neuropathy attacks the nerves found in the hips, thighs, buttocks, or legs. It doesn't affect the nerve ends like the peripheral neuropathy. It is prevalent with type 2 diabetic patients and older generations. The symptoms are mostly found on one side of the above-mentioned body parts, with a possibility of it spreading on the other side. Recovery may occur with time, with a possibility of poor prognosis. The symptoms are marked by a sudden onset of intense pain in the thigh, buttocks or hip. This eventually shrinks and weakens the muscles in the thigh and makes it difficult for the patient to rise from a sitting position. (Vinik 2009.)

It affects the thorax also known as thoracic radiculoneurophathy, making the abdomen swell, and a marked weight loss. Also seen is burning, sharp, dull, belt-like intense pain present on one side and may spread around the abdomen. The skin always can be hypersensitive, and reference pain occurs from another site rather than the stimulated site. There is also numbness following the complete spinal root of the affected nerve. The most common one is in the distal distribution of intercostal nerves. This can involve either a single spinal root or many. Contiguous territorial extension of the nerve may occur in a cephalad, caudal, or contralateral direction. (Scadding & Koltzenburg. 2003.)

If radicle neuropathy is in the chest and the abdominal cavity, it causes pain from the chest to the abdomen, following the roots found in these areas, there is also the weakness of the muscles is affected in the same direction the root is taking, this affects the upper lumbar root as well. This causes bulging of the ab-

dominal wall from abdominal muscle paresis of the thoracic root.( Narhoaki. 2011.)

Older patients who are 50 years or more who have poorly controlled high sugar levels have a higher occurrence. It's seen more in men than women, with a 50% weight loss. It's also prevalent in type 2 Mellitus which causes a significant weight loss to the patient. This also present in association with distal symmetrical polyneuropathy.

Diabetic radicle plexus neuropathy can also affect the cervical lumbosacral nerve path and has many names following the nerve it's been named according to the nerve which has been affected, including diabetic amyotrophic, Burns-Garland syndrome, and diabetic radicle plexopathy. The frequently reported symptoms include acute severe unilateral pain along the lower back, hip, or shoulder neck.

The muscle shrinks days to weeks later occurs, followed paresthesia and loss of sensory. Symptoms always occur on one side and eventually spread to the opposite side. Reflex test done in the affected area may be absent or very minimal. The root is normally unilateral, and a significant improvement over many months have been reported, however, severe damages nerve damages have been reported. (Papanas et al. 2010.)

## **5.4 Other Minor Neuropathies**

Diabetic neuropathic cachexia is found in the small fibre and causes autonomic dysfunction. It is characterized by dangerously severe weight loss, severe pain in the skin. This is seen mostly in older men and causes impotence. The neuropathy normally improves with tight blood sugar control. (Scadding & Koltzenburg. 2003.)

Asymmetrical neuropathies can be in a form of one or more cranial or somatic mononeuropathies. It is characterized by a single course, with the following syndromes, carpels tuners syndrome, which is a median neuropathy of the wrist, one or all limbs can be affected by single neuropathy, thoracic radicle

neuropathy, lumbosacral radicle plexus neuropathy, cervical radicle plexus neuropathy. These syndromes are differentiated from the others mainly by being in connection with angiitis and ischemia, and can severe or mildly severe, an example in example lumbosacral radicle plexus neuropathy. This is more common in a total lack of blood sugar control than with symmetrical polyneuropathies.(Smith et al.2006.)

Neuropathy found on the face has a severe or mildly severe onset, causing weakness on the face, though the taste is not always affected, it can be recurrent or affect both sides of the face. Anterior ischemic optical neuropathy can cause severe loss of sight or sight area abnormalities. The eye bone can be swollen, pale and bleeding may be seen. (Apfel. 2009.)

Mononeuropathy symptoms cause damages to a specific nerve, which can be on the face, leg, or body. It also has a sudden onset, and common in older adults. Although the pain caused by mononeuropathy is severe with a sudden onset, it doesn't have chronic problems. ( Arberg. 2010.)

The symptoms will disappear on their own after a period of weeks or months. Presentation of signs and symptoms will depend on the affected nerve, and are as follows, double vision, pain behind one eye, difficulty in seeing with one eye, one side of the face getting paralyzed, also known as Bell's palsy, shin, foot, chest or abdominal pain, or in front of the thigh. Mononeuropathy can be seen also in situations where the nerve has been pressurized by tumours and can cause numbness, weakness, pain and the treatment may involve surgery (Al-Quattan et al. 2004).

Somatic neuropathy is also found in the face, causing compression in obvious points of pressure, causing the death of the area due to lack of oxygen. This normally happens at the same nerve site to individual who don't have diabetes. The main nerve found in the hand can be affected, thus causing carpels tuners syndrome, which is prevalent with diabetic patients, the treatment is also same as for individuals without diabetes, who have the same syndrome. The symptoms always occur in both sides. The chances of the ulnar nerve to be caught at the elbow or peroneal nerve at the fibular bone are not normally increased on



patients who have diabetes. Neuropathy following entrapment of nerve has a severe onset and is associated with focal pain with weakness and loss of sensation following the nerve which has been affected. Multiple nerves may be affected also known as mono neuritis multiplex. (Singh et al. 2005.)

Distal symmetrical sensorimotor polyneuropathy is the most prevalent form of neuropathy amongst diabetic patients. It has many defined syndromes, with three key formats commonly accepted. The patient has to be diagnosed with diabetic neuropathy, by widely recognized definitions like the ones outlined by the American Diabetes Association or World Health Organization.

Affected are the sensory, autonomic and motor functions at different levels, with sensory disabilities seen more. The peripheral nerves are affected by chronic symmetrical symptoms while the longest nerves being damaged first. Symptoms from the patient are the normally painful sensation of tingling, tickling, pricking, or burning of skin and numbness. (Sunmer et al.2006.)

This starts from the toes and goes up the foot gradually in a stocking-like distribution over a long period of months to years. This similar pattern is also seen in the hands, affecting the fingers going upwards to the hand in a glove-like distribution. Finally, it may affect the front of the body and the head at a later stage. Wounds in the feet's and dead tissues are normally caused by lack of feeling to touch in the foot, weakness of muscles is also seen in the foot, and the reflex test is diminished on the knee, and ankle. (Abbott et al. 2008.)

## **5.5 Carpal tunnel syndrome**

This neuropathy is mostly seen in diabetic patients, the symptoms present with tingling or numbness of the fingers or hands, most affected fingers are the thumb, index, middle and ring finger. It is a prevalent type of compression neuropathy among diabetic patients.

It causes the hands to be weak and patients tends to drop things. There is also pain inside the thumb when moving the hand. Pain which is burning in nature can radiate from the fingers, hands, and up to the neck. It also characterized by

less feeling when touching, hands being clumsy swelling in the hands and arms, palms of the hands sweating a lot. (American Physical Therapy Association. 2007.)

## 6. MANAGEMENT OF DIABETES FOOT ULCERS

A skin ulcer is where an area of skin has broken down and you underlying tissues are exposed. Most skin ulcers occur on the lower legs or feet. The skin normally heals quickly if it is cut. However, in some people with diabetes, the skin on the feet does not heal so well and is prone to developing an ulcer. This can be even after a mild injury such as stepping on a small stone in your bare feet. (American Diabetes Association 2014.)

Studies show that people with diabetes are prone to foot ulcers and long-lasting wounds that might take a long time to heal or might not heal at all. Foot ulcers are more common if client has diabetes because one or both of the following complications develop in some people with diabetes. (Ahroni et al. 2009, 6.)

The nerves may not work normally because even a slightly high blood sugar level can, over time, damage some of the nerves. This is a complication of diabetes, called peripheral neuropathy of diabetes. The nerves that take messages of sensation and pain from the feet are commonly affected. The lose sensation in parts of the feet may not know if it damages feet. (Robinson et al. 2012,12.)

For example, if patient step on something sharp or develop a blister due to a tight shoe. This means that clients are also more prone to problems such as minor cuts, bruises or blisters. Also, if you cannot feel pain so well from the foot, you do not protect these small wounds by not walking on them. Therefore, they can quickly become worse and develop into ulcers narrowing of blood vessels (arteries) going to the feet. (Pub Med Health 2012.)

Diabetes patients have a high risk of developing narrowing of the arteries (peripheral arterial disease). This is caused by fatty deposits called atheroma that build-up on the inside lining of arteries (sometimes called furring of the arteries). This can reduce the blood flow to various parts of the body. The arteries in the legs are quite commonly affected. This can cause a reduced blood supply (poor circulation) to the feet. Skin with a poor blood supply does not heal as well as normal and is more likely to be damaged. Therefore, if you get a minor cut or

injury, it may take longer to heal and be prone to becoming worse and developing into an ulcer. (Centre for Diseases' Control & Prevention 2011.)

### **6.1 Factors increasing the risk of developing foot ulcers.**

The risk developing feet ulcers as a result of reduced feet sensation increases the longer you have diabetes and the older you are the poor diabetes is controlled. This is one of the reasons why it is very important to keep your blood sugar level as near normal as possible. (Stensel et al. 2009, 6.) Secondly, developing feet ulcers as a result of narrowed blood vessels (arteries) increases the longer you have diabetes, the older you become especially if you are male. In addition, any other risk factors for developing furring of the arteries, for instance, smoking, doing a little physical activity, having high cholesterol level, high blood pressure or are overweight. (Boyko et al. 2009, 22).

Other factors include having had a foot ulcer in the past, other complications of diabetes, such as kidney or eye problems. Lastly is if the feet are more prone to minor cuts, grazes, corns or calluses which can occur as a result of foot problems such as bunions which put pressure on points on the feet, wearing shoes that do not fit properly, which can put pressure on your feet and having leg problems which affect the way that you walk, or prevent you from bending to care for your feet. (Reginald et al. 2010.) Although foot ulcers can be serious, they usually respond well to treatment. However, foot ulcers can get worse and can take a long time to heal if you have diabetes, particularly if your circulation is not so good. In addition, having diabetes means you are more likely to have infections and an infection in the ulcer can occur. Occasionally, more serious problems can develop, such as tissue death also know as gangrene. (Kim & Steinberg 2013; 42).

## 6.2 Prevention of diabetes foot ulcers.

For better foot ulcer protection, step out in the right shoes. A study found that custom-made shoe insoles that ease pressure underneath the foot as a person walks may help prevent a second-foot ulcer better than standard insoles, which are made simply by measuring the shape of the foot. (Bijan et al. 2013, 3.) Among 150 people with diabetes-related nerve damage and recently healed foot ulcers, those wearing the experimental insoles were three times less likely to get a second ulcer than participants who used the standard insoles. Prevention of foot ulcers is important because they are costly to treat, limit mobility, and can lead to amputation. (Miriam 2014, 10).

Feet regularly examined of most people with diabetes are reviewed at least once a year by a doctor and other health professionals. Part of this review is to examine the feet to look for problems such as reduced sensation or poor circulation. In case problems are detected then more frequent feet examinations is usually be recommended. (Fariborz et al. 2013, 3.)

Treatment of diabetes and other health risk factors is a rule, the better the control diabetes, the less likely you are to develop complications such as foot ulcers. Also, where appropriate, treatment of high blood pressure, high cholesterol level and reducing any other risk factors will reduce your risk of diabetic complications. In particular, if you smoke, you are strongly advised to stop smoking. An obese diabetic client triples the action that should be taken in order to prevent foot ulcer and its complications. (Alireza et al. 2013,3.)

Concerning foot care, researchers have shown that people with diabetes that take good care of their feet and protect their feet from injury are much less likely to develop foot ulcers. Good foot care includes using moisturizing oil or cream for dry skin to prevent cracking. Check the feet after two days especially in-between the toes. If a client cannot do this by himself, should get someone else to do it on behalf. Checking is particularly important if you have reduced sensa-

tion in your feet, as you may not notice anything wrong at first until you check. (Gholamreza et al. 2010, 15.)

In addition, on noticing anything new (such as a cut, bruise, blister, redness or bleeding) and don't know what to do, see the doctor. Clients can also see a person qualified to diagnose and treat foot. Do not try to deal with corns, calluses or other foot problems by yourself. They must be treated by a health professional such as a podiatrist, do not use chemicals or acid plasters to remove corns, etc. However, do not apply oil between the toes, as this can cause the skin to become too moist which can lead to an infection developing. (World Health Organization 2009.)

Lastly, athlete's foot (a common minor skin infection) must be always checked. This causes flaky skin and cracks between the toes, which can be sore and can become infected. If you have athlete's foot, it should be treated with an antifungal cream. (Alan et al. 2007.)

Cut nails by following the shape of the end of your toe. But, do not cut down the sides of the nails, or cut them too short, or use anything sharp to clean down the sides. Washing the feet regularly and dry them carefully, especially between the toes. Lastly is about tips to avoid foot burns include: checking the bath temperature with your hand before stepping in; not using hot water bottles, electric blankets or foot spas; not sitting too close to fires. (Dalla & Faglia 2006.)

### **6.3 Treatment of diabetes foot ulcer.**

Successful treatment of diabetic foot ulcers consists of addressing these three basic issues which include: - debridement, offloading, and infection control. By approaching the three key measures could lead to a positive result in tackling foot ulcer problem among general public not only those with diabetes. Apart from these three points, wound dressing also play a key role in wound care and helps prevent the wound from external pathogens that can prolong the healing process. (Padova et al. 2006, 4.)

Debridement is the removal of all necrotic tissue, peri-wound callus, and foreign bodies down to viable tissue sometimes referred to as debris. Proper debridement is necessary to decrease the risk of infection and reduce peri-wound pressure, which can impede normal wound contraction and healing process. After debridement, the wound should be irrigated with saline or cleanser, and a dressing should be applied. (Singh et al. 2005, 14.)

Dressing prevents tissue dehydration, absorb excess fluid, and protect the wound from contamination. There are hundreds of dressings on the market, including hydrogels, foams, calcium alginates, absorbent polymers, growth factors, and skin replacements. Becaplermin contains the  $\beta$ -chain platelet-derived growth factor and has been shown in double-blind placebo-controlled trials to significantly increase the incidence of complete wound healing. Its use should be considered for ulcers that are not healing with standard dressings. (Abano et al. 2006, 4.)

Offloading reducing pressure excreted by walking, the pressure can cause infection and can make the wound expand. By allowing patients use a wheelchair or crutches to completely halt weight bearing on the affected foot is the most effective method of offloading to heal foot ulceration. (George et al. 2014.)

Total contact casts (TCCs) are difficult and time-consuming to apply but significantly reduce pressure on wounds and have been shown to heal between 73 and 100% of all wounds treated with them. Postoperative shoes or wedge shoes are also used and must be large enough to accommodate bulky dressings. Proper offloading remains the biggest challenge for clinicians dealing with diabetic foot ulcers. (Armstrong et al. 2006, 20.)

The Infection prevention and control measures aim to ensure the protection of those clients might be vulnerable to acquiring an infection both in the general community and receiving continuous care due to health problems, in a range of settings. The basic principle of infection prevention and control is good hygiene (World Health Organization 2015.)

Limb-threatening diabetic foot infections are usually, as a result, numerous species of microorganisms. Commonly encountered environmental pathogens or

airborne pathogens may result in infections with significant morbidity or even death. Antibiotics selected to treat severe or limb-threatening infections should include coverage of gram-positive and gram-negative organisms and provide both aerobic and anaerobic coverage. Patients with such wounds should be hospitalized and treated with intravenous antibiotics. (American Diabetes Association 2010.)

Mild to moderate infections with localized bacterial skin infection can be treated on an outpatient basis with oral antibiotics such as cephalexin, amoxicillin with clavulanate potassium, moxifloxacin, or clindamycin. The antibiotics should be started after initial cultures are taken and changed as necessary despite these advances, it is imperative to remember the fundamental basics in the healing of diabetic foot ulcers: adequate perfusion, debridement, infection control, and pressure mitigation. (Armstrong & Lavery 2005, 4.)



## 7. TREATING PAIN

Since chronic pain has so many contributing causes - physical, mental, and emotional there are many ways to break the pain cycle, reduce pain levels, and gain comfort. There may not be a cure for chronic pain, but a person can gain some control over his pain. Feeling more in control, even a little bit, can help people relax, try new things, and gain even more control. In this way, even severe chronic pain can be managed, and the person with pain can gain better health in the process. There are five main approaches for treating and self-managing pain. These include physical, neurological, mental, spiritual, and "alternative" approaches. (International Association for the Study of Pain (IASP), 2010, 1.)

### 7.1 Physical control

Physical treatments for chronic pain can include applying heat or cold to the part that hurts, massage, exercise, and rest. Sensations of heat, cold, and touch travel on the same nerves as pain sensations, but they travel faster. A sensation of gentle touch, heat, or cold will, therefore, beat a pain signal to the next pain gate and block the pain from getting through. Exercise is often one of the best treatments for pain. (NICE Clinical Guideline, 2013). Strengthening muscles ease pressure on the joints and tendons. It also gives a greater sense of control, which significantly helps people deal with pain. Stretching to increase your flexibility can also be helpful for pain relief when done as part of a regular exercise routine. Walking, sitting, and moving with good posture and balance can take pressure off tender muscles and nerves. One may want to consult a physical therapist to find exercises that are right for them. Massage and other kinds of bodywork can greatly relieve pain. Bodywork can include acupuncture, shiatsu, and various other types of therapeutic touching or manipulation of the body. (International Association for the Study of Pain (IASP), 2008.)

## 7.2 Neurological control

Many drugs can help calm down overactive pain nerves. These include antiseizure medicines such as gabapentin (brand name Neurontin) and pregabalin (Lyrica). Since seizures are the most obvious case of oversensitive nerves, it makes sense that seizure drugs might help chronic pain. Lyrica seems to have fewer side effects than Neurontin and another drug, Topamax, which often cause mental fogging. (Hall, Morant, & Carrol 2013, 5).

Electrical stimulation can sometimes block pain signals from traveling up the nerves. The most commonly used system is called TENS, which stands for transcutaneous electrical nerve stimulation. TENS works by sending electrical pulses across the surface of the skin into the nerves. The stimulating pulses help prevent pain signals from reaching the brain. They also help stimulate your body to produce higher levels of its own natural painkillers, called endorphins. (Hall, Morant, & Carrol 2013, 5.)

Relaxation exercises, meditation, and prayer also help nerves calm down. So can doing relaxing things like spending time in nature, playing with a pet, or engaging in a hobby like knitting or painting. Chronically high blood glucose levels are known to damage nerves, so keeping blood glucose levels close to the normal, nondiabetic range can greatly reduce neuropathic pain. (Sometimes, however, if nerve damage has caused numbness in the feet, legs, hands, or arms, improving blood glucose control can cause pain in these areas as the nerves start to heal and regain function. The pain is usually temporary. (William & Morley 2012, 11)

## 7.3 Mental control

Thoughts can affect pain severity. As in case during wars, soldiers' wounds often are less painful than the same wounds would be in a civilian. Injury is a source of fear and anxiety. When pain is a source of fear, anger, or grief, it usually hurts more. Cancer patients may experience worse pain because they fear it means their disease is worsening or that they may be dying. Because the

thoughts about the pain have a major effect on how bad it feels, it can help to change those thoughts. (Turk, Audette & Levy 2010, 21.)

Distraction is one of the best short-term mental approaches. A study by the Chronic Disease Self-Management Program; Stanford University 2013, recommends mental exercises, for example, those associated with counting imagery or playing a game. Several studies have found out that playing computer or video games to be a considerable pain reliever. Certain drugs that affect the brain can help to control chronic pain. Antidepressants in the class of drugs known as selective serotonin reuptake inhibitors (SSRIs), which including duloxetine (Cymbalta), are usually prescribed for pain. So are tricyclic antidepressants (TCAs) such as amitriptyline (Elavil). SSRIs often boost energy, while TCAs can make. According to the Harvard Medical School, 2010, some physicians prescribe an SSRI during the day and amitriptyline at bedtime for pain patients. Narcotic medicines, which include opiates such as morphine and synthetics such as oxycodone, are sometimes given for pain. Narcotics dampen all senses, not just pain. Because of side effects including sleepiness, constipation, and addiction, they are less often used for chronic pain than they used to be. But they are still very helpful for some people, and most chronic pain specialists will prescribe them. (Turk, Audette & Levy 2010, 2.)

## **7.4 Spiritual control**

Spiritual approaches help many people with chronic pain. With chronic pain, one needs to connect or return to all positive aspects of one's being and one's life. By the same token, everyone has internal sources of positivity: one's faith, one's awe and appreciation of nature or life itself, and qualities like strength, courage, wisdom, hope, and inspiration." A part of you that sees what your mind and body are going through, but does not identify as the one who is suffering. The practice helps to open up a bigger sense of an individual and so see that pain as only part of the experience. (Karen & Burt 2010, 6)

## 7.5 Alternative therapies

Traditional medicines such as herbs and oils have long been used to relieve pain. Studies have shown a significant healing effect from rubbing on certain essential oils including lavender, peppermint, etc. Many herbal remedies have been used to reduce inflammation and pain. According to the online publication of U.S. Pharmaceutics at the Campbell University School of Pharmacy in North Carolina, noted that bromelain or pineapple enzyme, curcumin an antioxidant found in turmeric, Echinacea, chamomile, ginger, and arnica have shown anti-inflammatory effects. Preparations of these plant-based supplements are widely available at health-food stores. Like to (Antoine & Al-Achi, 2012, 15.)

## 7.6 Whole body-mind treatments

Since chronic pain is a whole body-mind experience, the total physical and mental health comprises much when it comes to pain. In addition to improving the blood glucose control, dropping weight is highly recommended. Shedding some extra weight relieves the pressure from the back, hips, knees, and feet, possibly reducing pain exerted on these parts. Likewise, change of diet is important as the variety of foods may well make the pain worse or better. Those affected should consider the type of food they take and their response on pain. (William et al 2012, 7). Many try to push them to the extent where the pain or fatigue becomes unbearable. Then get some rest before carrying on further again. In this case there is needed to prevent this cycle by pacing yourself: Figure out how much you can do without pain, and stop before you reach that point. Rest up, then start again. You'll get more done with less pain. Several studies show laughter is among the best medicines for pain. Watching funny videos or read the humorous writing, watch kids or puppies play, or do whatever it takes to make one laugh. The effect seems to be the same. A good night's sleep is great medicine for pain. There are many medical and behavioural approaches to help you sleep. (Guthrie, 2012 10.)

## 7.7 Challenges of pain management process

Various studies have showed that chronic pain is a prevalent condition among patients with diabetes. Furthermore, the presence of comorbid chronic pain and greater pain severity are both associated with poorer overall diabetes self-management and increased difficulty with certain self-care activities, such as exercising on a regular basis according to American Diabetes Association. These findings emphasize the importance of considering potential competing demands, such as chronic pain, when developing self-care regimens for patients with diabetes and other chronic health conditions that require high levels of self-management. (Cheing & Luk 2005. 9.)

Although innovative self-management programs for patients with a wide array of chronic conditions and comorbidities are being developed, a disease-specific focus continues to be the primary method for self-management education. The results indicate that a more broadly focused approach that equips patients with the skills and confidence to manage chronic illnesses, in general, may be more effective in improving patients' diabetes-related self-care. (Scadding J, 2003.)

The findings in other researchers point out that treatment of chronic pain by taking pain medication will improve diabetes self-management while in some cases, it does not completely eliminate the negative effect of chronic pain on self-management. However, taking pain medication is only an alternative measure. However, in a prior VA diabetes study, a higher score on the same self-management scale was associated with lower A1C levels, with a self-management score of corresponding to a predicted haemoglobin A1C level of 7.7% and a self-management score of corresponding with an A1C level of 8.3% (24). (Cheing & Luk 2005). In the current study, as shown above, the self-management scores for patients with chronic pain were substantially lower than those for patients without chronic pain, which suggests the potential for poorer glycemic control among this subgroup of patients. Nonetheless, the effect of chronic pain on the achievement of good glycemic, lipid, and blood pressure control requires additional research. (Turk, Audette & Levy 2010, 3.)

This further highlights the often observed link between pain and depression and between chronic pain and poor self-rated health. Moreover, there is an independent association between chronic pain and self-management even after these relationships are taken into account. Similar to prior research it is found that a positive depression screen affects patients' performance of certain activities, such as taking diabetes medications and following an eating plan. On the other hand, our results did not show a significant association between depressive symptoms and exercise, as found in previous work but and so revealed that both the presence of chronic pain and pain severity had a significant effect on patients' reported difficulty with exercising. (Cheing & Luk 2005, 13.)

As Nice Clinical Guideline 2014 suggests, the rapidly growing number of individuals with diabetes and the potential for poor outcomes without proper management only serve to heighten the importance of providing optimal diabetes care and improving patient self-management. One possibly significant but generally overlooked aspect of diabetes care is how other chronic conditions, such as chronic pain, might complicate and/or serve as a competing demand in a patient's ability to engage in self-care activities. The study suggests that comorbid chronic pain may be a major limiting factor in the performance of certain self-care behaviours and thereby reinforces the need to proactively address such potential competing demands as we seek to support and improve patients' diabetes self-management. (Turk, Audette & Levy 2010)

## **7.8. Prognosis**

The rate of death is really high in patients who have been diagnosed with cardiovascular autonomic neuropathy (CAN). A research done in 10 years, for patients who died due to heart-related neuropathy, found 27% of patient with diabetes mellitus, in comparison of 5% mortality rate in patients who didn't. Foot ulcers and amputations of the toes, feet, or legs, made the movement of patients really difficult. This two complication was found to be the most common cause for hospital admission in diabetic patients in the western countries. (Waldsman. 2006.)

The quality of life for a diabetic patient is mostly reduced by common symptoms such as severe pain, diarrhoea, impotence, and dizziness. A patient who has peripheral neuropathy has a good prognosis though their quality of life is also reduced by symptoms associated with peripheral neuropathy mentioned earlier.

Autonomic neuropathy signs and symptoms, are fast beating of the heart while resting, hypotension, low blood pressure that happens when standing up from sitting or lying down, causing dizzy or lightheaded, and maybe even faint, loss of normal sinus arrhythmia, loss of normal sinus arrhythmia ratio, loss of normal sweating ability, causing the body to overheat, bowel or bladder incontinence, and eye pupil slow reaction light. (Sumner. 2003.)

Medical attention should be highly advocated in diabetic patients with a cut or a sore in the foot which healing is not forthcoming, has an infection, or getting worse. Also, burning, tingling, weakness or pain in felt in hands or feet that affects normal way of living or sleeping, dizziness, changes in digestion, urination or sexual function should be monitored by a medical professional. (Scadding J and Koltzenburg. 2003.)

Although the above symptoms may not always mean a nerve is damaged, but also be significant in other medical conditions which require medical procedures. All in all, the sooner a diagnosis is made, the better a chance for controlling symptoms and thus preventing more complicated diagnosis. Foot ulcers if left untreated, normally leads to the death of tissues also known as gangrene, and surgery or amputation of the foot may follow. This can be prevented early by treatment and wound care. (Shemmel et al. 2010.)

Inadequate or untreated diabetes caused a higher death rate and many complications in diabetic patients than patients who observe tight control of diabetes. Injury occurring many times in the affected area may lead to loss of skin causing wounds and infection, followed by amputations and probably death. (Smith et al. 2006.)

Diabetic neuropathy treatment is not an easy task to both the physician and the patient, and most medications normally do not relief symptoms completely. Though clinical research and trials are currently being undertaken to find better

treatment methods to relieve symptoms and slow the progress of the neuropathies. ( Singh et al. 2005.)

## **7.9. Risk Factors and Complications**

Poor glycemic control. If there is a lack of tight control of blood sugar levels, the complications associated with diabetes will be catastrophic, including damaging of nerves. Blood sugar level should be consistent with the normal ranges, and this helps protect nerve and blood vessels. The length of time. Neuropathies worsen more the longer a patient has diabetes, especially with uncontrolled sugar levels in the blood. Peripheral neuropathy is more common especially with a diabetic diagnosis of over 25 years. Kidney damages caused by diabetes increases toxins in the blood which also causes nerve damages. Smoking causes arteriosclerosis and narrowing of the arteries, which in turn will reduce blood flow to the legs and feet. The wounds, therefore, lacks nutrients necessary for healing and damages occur in the peripheral nerve integrity. (Hilsted et al. 2007, 14).

Loss of sensation due nerve damage in the limbs normally leads cuts and sores and infection which are not felt by the patient and can eventually lead to loss of a leg. This infection risk can escalate and be difficult to treat causing amputation of the toe.

Charcot joint usually in the foot joint due to damage of the nerve. The symptoms include loss of sensation, swelling, instability and the joint itself can sometimes be deformed.

If the nerves which control the bladder emptying is damaged, it makes the bladder not empty all urine, and eventually causes the bladder and kidneys to be infected by bacteria, which can easily cause blood poisoning known as sepsis. (Meijer et al. 2009, 19).

Low blood sugar levels of up to 70mg/dl or 3.9 mmol/l, can cause sweating, fast heart b or shakiness, and, therefore, blood sugar levels need to be raised im-



mediately. Autonomic neuropathy may cause a patient fail to notice these symptoms, which can be fatal. If nerve which cares for blood pressure is affected, it cannot regulate the pressure when the patient stands from sitting position, making patient to easily fall down. (Skyler. 2006).

Damage of nerves found in the digestive system can cause severe constipation, diarrhoea, or in the interchange of diarrhoea and constipation, nausea, bloating, vomiting, and loss of appetite. The stomach may empty slowly or fail to empty at all, which is a serious digestive complication known as gastroparesis. This can be managed by eating small meals frequently and reduction of reduction of fatty food and fibre.

It can also affect the nerves found in the reproductive system, causing impotence in men and difficulty in lubrication and urge to have sex in women. If it affects sweating ability, it can be fatal since it affects the ability of the body to regulate temperature, or can cause patient to sweat excessively during the night. (Waldman. 2000.)

It also affects the patient emotionally and all this complications, such as pain, morbidity, and embarrassments such as incontinence and sexual dysfunction, independence robbery, leads the patient to depression and thus tend to be more isolated.

Autonomic neuropathy often damages the nerves that affect the sex organs, leading to erectile dysfunction in men and problems with lubrication and arousal in women. When the sweat glands don't function normally, your body isn't able to regulate its temperature properly. (Joung et al. 2009.)

Autonomic neuropathy also causes excessive sweating, particularly at night. If lack of sweating is reduced or completely lacking can be life threatening because the body won't regulate heat properly.

The pain, disability and embarrassment caused by nerve damage can rob people particularly older adults of their independence, leaving them increasingly isolated and depressed. ( Sugimoto k et al. 2000.)

## 8. SELF-MANAGEMENT IN DIABETES

Self-care is a complicated topic in health care field which involves clients' personal effort in improving or maintaining personal health. The patient must accept and be focused on following the stipulated rule in order to attain good result as far as self-care is a concern. In comparison to any other human being clients often do not follow even the rule, as a result, the set goals are not attained. Diabetes is affection millions of people in the world and the number of pre-diabetes or those having a high risk of becoming diabetic my double the number of diabetic clients in the year 2030, hence there is a need to give the client the opportunity to self-management. (American Diabetes Association 2007.)

Self-monitoring of blood sugar the basis of diabetes care that helps ensure patient participate in achieving and maintaining specific glycemic targets. Attaining the goal can be done by ensuring that client's eats low glycemic index foods, especially carbohydrates containing food that always increases blood sugar (Carter K et al 2015). Self-monitoring provides information on the up to date blood sugar status, hence helps during assessment and guiding adjustments for diet, exercise and medication in order to achieve optimal blood sugar control. Apart from weight loss, participating in daily physical activity has been found to be linked with improved health outcomes among diabetic clients. (Mary et al. 2009).

In addition, Self-management helps in lowering the cost of treatment of care in general. This is so because the client can do something by themselves wish does not need a health professional to attend to them. Hence, the clients will save money that was to be paid to health care providers. On the other hand, it will help authorities cap the shortage of health care providers, and, in turn, improving the quality of service since there will be enough health care professional, consequently improving the quality of life. (World Health Organization 2010.)

Furthermore, over the last five years, there has had a rapid growth in self-management and the role it plays in attaining patient goals. Religion has also played a very important role in helping and encouraging clients spiritually which give them hope to face the future in a positive way. Diabetes might be a lifetime disease that requires the willingness and positive attitude of the client in order to realize the set goals. (Moghissi et al. 2009.)

Nevertheless, the value of increasing self-management provision through primary care is discussed in relation to three conditions that form a large part of the primary care caseload: arthritis, asthma, and diabetes. The typical management tasks associated with each condition usually considered in terms of differences and commonalities. The implications of such similarities and differences for implementation of self-management on a much wider scale in primary care are under-discussed. (Carole et al. 2007, 25.)

Lastly is about the topic of diabetes self-management education which will be dealt in detail in the next sub-topic. The topic is of great importance because it is the back-bone of self-management. Clients must be educated on what to do and what they must do in order for them to be successful in the self-care programme. The most important topics are nutrition, exercising, measuring of blood sugar and even foot care among other topics depending on the client's condition and the ability to perform the stipulated roles. (Dobson et al. 2015, 3.)

## **8.1 Diabetes self-management education**

Diabetes self-management education (DSME) is the continuous process of providing the knowledge, skill, and ability necessary for diabetes self-care. This process brings together the needs, goals, and life experiences of the person with diabetes and is guided by evidence-based standards. The overall objectives of DSME are to support informed decision-making, self-care behaviours, problem-solving and active collaboration with the health care team and to im-

prove clinical outcomes, health status, and quality of life. (Jackie et al. 2007, 25.)

Family member is of great importance too in clients self-management. The support offered by family members to their loved ones impacts positively in self-management, the attitude and willingness of the diabetic client is strengthening by a family member of loved ones. Self-care education should be also extended to family members that will help health providers in assessments and for the member to know what their diabetic family member must do in order to reach the goals set. (Pub Med Health 2009.)

Even though self-management is by far the most practical and cost-effective approach to self-care evaluation and yet is often seen as unreliable. Diabetes self-care activities are behaviours undertaken by people with or at risk of diabetes in order to successfully manage the disease on their own. Self-management education provides all the answers required by the client in order to make their choices after knowing the advantages, disadvantages and the final outcome of self-care. (Jackie et al. 2007, 25.)

In addition, it was observed that self-care includes not only performing these activities but also the inter-related between them. Diabetes self-care is not only about glucose control but also understanding your diabetes by learning more about diabetes oneself and behaviour change and making a difficult decision in order to realize the optimal goals and avoid diabetes complication. (Cutfield et al. 2015, 3.)

Furthermore, the issue of genetic diabetes should be taken into consideration in a family setting to help the young generation who might be at high risk of becoming diabetic because of their family diabetes history. Diabetes has not been declared as inherited but it is also difficult to rule it out since there is family which are been affected by diabetes for a generation. Diabetes type two as been associated with gene mutations that are also linked to family ties. The risk of developing diabetes is also higher if your parents have been diagnosed with diabetes before the age of 50. (American Diabetes Association 2013.)

According to American Association of Clinical Endocrinologists, the importance of patients becoming active and knowledgeable and actively participating in their diabetes care has helped in attaining the optimum goal. Likewise, WHO has also recognized the importance of patients learning to manage their diabetes and the need to avoid complication that arises as a result of diabetes. (Martha et al. 2007, 32.) The American Diabetes Association meta-analysis of self-management education for adults with type-2 diabetes revealed improvement in glycemic control at immediate follow-up. However, the observed benefit declined one to three months after the intervention ceased, suggesting that continuing education is necessary. (American Diabetes Association 2007).

A review of diabetes self-management education revealed that education has been successful in maintaining the required blood sugar levels. Diabetes education is important but it must be transferred to action or self-care activities to fully benefit the patient. Self-care activities refer to behaviours such as following a diet plan, avoiding high-fat foods, increased exercise, self-glucose monitoring, and foot care (Etie et al. 2009, 32.) Maintaining the right glucose in blood may be the ultimate goal of diabetes self-management but it cannot be the only objective in the care of a patient. Since there is another important issue such as coping and dealing with complication and proper, for instance, foot care. Changes in self-care activities should also be evaluated for progress toward behavioral change. (Dobson et al. 2015, 3.)

## **8.2 Diabetes compliance to self-care activities.**

The majority of patients with diabetes can significantly reduce their chances of developing long-term complications by actively participating in self-care activities. Despite this fact, client's compliance or adherence to these activities has been found to be low as per the set goal, especially when looking at long-term changes. Health care providers should not blame clients for their compliance

but they should have a positive attitude as health care providers and look for ways of improving client compliance to self-care. (Pub Med Health 2009.)

In a study conducted among people with diabetes, only 30% were compliant with drug regimens and the non-compliance was higher among the lower socio-economic groups. One of the realities about type-2 diabetes is that only being compliant to self-care activities will not lead to good metabolic control. Research work across the globe has documented that metabolic control is a combination of many variables, not just patient compliance. (Belvis et al. 2009, 85.)

In an American trial, it was found that participants were more likely to make changes when each change was implemented individually. Success, therefore, may vary depending on how the changes are implemented, simultaneously or individually. Some of the researchers have even suggested that health professionals should tailor their patient self-care support based on the degree of personal responsibility the patient is willing to assume towards their diabetes self-care management. (American Diabetes Association 2008.)

The following treatment as required in diabetes is an area of interest and concern to health professionals and clinical researchers even though a great deal of prior research has been done in the area. Diabetes patients are required to follow a complex set of behavioural actions to care for their diabetes daily. These actions involve engaging in positive lifestyle behaviours, including following a meal plan and engaging in appropriate physical activity; taking medications (insulin or an oral hypoglycemic agent) when indicated; monitoring blood glucose levels; responding to and self-treating diabetes-related symptoms; following foot care guidelines; and seeking individually appropriate medical care for diabetes or other health-related problems. The proposed routine is further complex by the need to incorporate and sequence all of these behavioural responsibilities into a patient's daily routine (American Diabetes Association 2009.)

Obesity is another major challenge in diabetic clients, in most cases the client willpower is very low and it is often very difficult to make such persons adhere to

simple rule since most of the give-up the fight. The fact that there are now two issues that need immediate attention of the client make it more complicated because a part from being obese, the client is diabetic. Health professional must come together in helping such client's the importance of self-care with or without diseases. (Martha et.al 2007, 32.)

### **8.3 Addressing needs of diabetic patients.**

The biggest challenges facing health care providers today is addressing the continued needs and demands of individuals with chronic illnesses like diabetes. The significance of regular follow-up of diabetic patients with the health care provider is of great importance in preventing any long term complications. Studies have reported that strict metabolic control can delay or prevent the progression of complications associated with diabetes. (World Health Organization 2010.)

The needs of diabetic patients are not only blood sugar control. It extends also to preventing complications, disability limitation and rehabilitation and, more importantly, providing education to the client on diabetes as a disease and ways of coping with it as it is a long-term disease. The introduction of home blood glucose monitors and widespread use of glycosylated haemoglobin as an indicator of metabolic control has contributed to self-care in diabetes and thus has shifted more responsibility to the patient. In a study done in Scotland, it was suggested that the role of the health professional is crucial to patient's understanding of their blood glucose fluctuations with an appropriate self-care action. (Carter et.al 2009, 32.)

### **8.4 Barriers to diabetes self- care.**

Depression among clients affected by diabetes is on the rise worldwide, health care professional are faced complex challenge of helping clients cope with dia-

betes. Combining depression diabetes and self-care has proven to be a difficult task to the patient. Hence, depression has undermined the efforts of health care providers to help diabetic clients cope and self their diabetes independently. (World Health Organization 2015.)

The role of healthcare providers in the care of diabetic patients has been well recognized. Socio-demographic and cultural barriers such as poor access to drugs, high cost, patient satisfaction with their medical care, patient-provider relationship, the degree of symptoms, unequal distribution of health providers between urban and rural areas have restricted self-care activities in developing countries. (Korytkowski et al. 2009, 32.)

In a study to identify the barriers from the health professional's point of view in regard to diabetes self-care, the factors like patient knowledge on the right blood glucose level and even blood pressure and the high cost of treatment were the major barriers to self-care. Another study stressed on perception, lack knowledge about diabetes, negative attitude and client's behaviours affecting many patients negative in attaining goals of self-management and quality of life. Poor communication between health professionals with clients and the challenge of mentally challenged client hinders self-care activities. (Mary et al. 2009, 13.)

## **8.5 Recommendations for diabetes self-care.**

Health care providers should begin by taking the time to evaluate their patients' perceptions and make realistic and specific recommendations for self-care activities. Bearing in mind the elderly here in Finland for instance, some patients may experience difficulty in understanding and following the basics of diabetes self-care activities. Many elderly diabetic clients are not in a position to make important decision required for a successful self-care. Others are affected by a mental problem such as dementia affecting many old people here in Finland



and whole over the world which makes it difficult of them to adhere of diabetes self-care activities. (Pub Med Health 2010.)

Diabetes self-care activities can have a dramatic impact on regulating glycosylated haemoglobin levels. Therefore, healthcare providers and educators should evaluate patient barriers to self-care behaviours and make recommendations with these in mind. Unfortunately, patients often look upon healthcare professional for guidance, regrettably many healthcare providers are not always discussing self-care activities with their patients. (Mary et al.2009, 32.)

Furthermore, these requirements or modifications should be specific for each patient and should be altered depending on the patient's response. It is critical that health care providers actively involve their patients in developing self-care regimens for each individual patient. This regimen should be the best possible combination for every individual patient plus it should sound realistic to the patient so that he or she can follow it. (Jackie et al. 2007, 25.)

Simultaneously, health care providers should fully document the specific diabetes self-care regimen in the patients' medical record as it will facilitate provider-patient communication and help in the assessment of compliance. Also, the need of regular follow-up can never be underestimated in a chronic illness like diabetes and, therefore, be looked upon as an integral component of its long-term management. (American Diabetes Association 2007.)

Lastly is concerning communication between diabetic clients, health professionals, family members and even friends should be the among core factor in ensuring that patients get the required education and support and encouragement with dealing with the complex issue of self-management and making in the process of making right choices and decision in life. It helps them also realize that they are not alone in the fight against diabetes but it is rather a collective force fighting with him to attain the goal of healthy living with diabetes. (Jaana et al. 2003, 26.)

## 8.6 Patient education and Nursing Care Plan

Diabetic neuropathy patients should get an adequate education about their condition especially the importance of tight blood sugar levels control. It's really important that once a patient has been diagnosed with diabetes, they should at all time achieve normal blood sugar levels. This also benefits from patients with neuropathy, and normal sugar levels help lowers blood significantly. Sometimes pain medication will not help, but tight control of sugar levels to normal which with discipline, a patient can achieve may reduce pain. (Sumner et al. 2006, 29.)

Being active as possible is also paramount though a patient with severe sensory loss or lack of autonomic function should not exercise if the weather is extremely hot or cold. This can cause frostbites in extremely cold or overheating. It's advisable for these patients to consult a doctor before any exercise regime.

It is really important for patients to always take controlled meals which are nutritious, and aids in stopping secondary complications associated with diabetes. Together with a medical caregiver, this can be achieved, by making a plan for lowering sugar levels in the blood, and reducing the fluctuation of the latter.

Wearing of protective shoes and personal hygiene is also important. Caution should be taken when trimming nails to avoid wounds. If bacterial or fungal infections are suspected, they should be treated immediately, by a medical professional. Wearing fitting shoes and appropriate clothing's is also important.

Diabetic neuropathy also affects the eyes also known as retinopathy, can cause blindness. Good eye care with the aid of an ophthalmologist, making appointments with regular follow-up should be discussed and planned by a caregiver. (Smith et al. 2010.)

## 9. VALIDITY, RELIABILITY AND ETHICS

Efforts were made to ensure this topic met the criteria for validity and reliability as possible by using the already recognized academic databases. Key points were extracted from various accepted articles and books and properly utilized. In some cases, there occurred certain differences and conflict of ideas between the authors but efforts were made to ensure that a common ground was reached. (Last.,2011, 78.)

Meanwhile, the topic was certified by our supervisors before proceeding and a continuous check is done on it until the final stage to make sure it is close to perfection. All the articles used are not below the year 2005 though some articles based their conclusions on the old reports compiled before the year 2005 but those articles that compared this reports with the current situation were selected. (Last.,2011, 87.)

Issues of ethical behavior are essential to health professions. In conducting clinical trials and research projects ethical issues should be taken into consideration This thesis was carried out through a review of existing research materials. Therefore no questionnaires, interviews or observations were included as part of the methodology. (Fowler, Jarves & Chevannes 2006.)

Human subjects were also not directly included in the data collection process and thus, the need for privacy and confidentiality of their names and identities were not taken into much consideration. Little consideration was furthermore directed on the risk of harm. The focus on ethics was aimed at collecting and analyzing the relevant data. Articles used were accurately reported to avoid any bias. Direct quotations were accurately noted and accounted for by using correct referencing according to Turku's thesis guidelines. (Fowler, Jarves & Chevannes 2006.)

## 10. WEBPAGES

According to the Information architecture of World Wide Web, 1998, “a web page is a Web document that is suitable for the World Wide Web and the web browser”. The research document will be published as an informational web page to educate the public concerning the pain and its management in diabetes. (Zhu et al 2007, 55.)

The content will be accurate, timely specific and organized for a purpose. Its context is introduced to give the meaning and the relevance it deserves and, in this case, will lead to the broadening in understanding. Information presented as a web page can affect behavior, a decision, or an outcome of various groups of people interested with the document laid out. (Zhu et al 2007, 57.)

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## 12. APPENDIX

TABLE 1. Search Words.

Search Words	Number of Hints
Pain	2502
Diabetic Pain	3771
Pain management	9530
Assessment	3381
Diabetes	64396
Mellitus	9518
Peripheral Neuropathy	502
Pain control	10578