Systematic Review of Therapeutic Care in Diabetic Patients with Orthopedic Problems based on Radiological Points in ICU & OR

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Abstract

Diabetes is a very common disease that affects one out of three adults. Diabetic neuropathy is one of the most probable complications that occurs as a side effect of diabetes and due to the effect of high blood sugar on nerve fibers throughout the body. Neuropathy is a pathological complication that has more than a hundred different types and occurs as nerve damage in diabetic and non-diabetic patients. Diabetic neuropathy can trigger a cascade of events and even lead to more serious complications. Just like diabetes itself, peripheral neuropathy does not have a definitive treatment; It is only possible to manage the disease and stop its progress. Diabetic foot is one of the complications of diabetes that occurs in the feet. In general, diabetic foot is one of the common problems of people with diabetes, as a result of which the patient may lose his foot. For this reason, diabetics must take special care to prevent infection and uncontrollable wounds. High blood sugar and uncontrolled diabetes for a long time cause damage to the nerves of the legs and decrease the blood flow in the lower limbs, including the legs, because the leg is in the lowest part of the body and the blood supply to this area may be less. The findings of this research have shown that neuropathy caused by diabetes may cause various pains and even physical injuries to the feet in addition to causing numbness or lack of sensation in the feet. Neuropathy can cause the skin to become dry and damaged. The result of these skin injuries are calluses and various wounds on the feet. In addition to ugliness, pain and discomfort, leg ulcers slow down and reduce blood flow and cause; The situation is worse than before. Numbress of the feet in this situation makes it extremely difficult to take care of the feet. An ordinary person feels the pain as soon as his leg is injured, and as a result, whether he wants to or not, his attention is drawn to his feet and he takes care of them.

Key words: Diabetic Foot, Anesthesia, High Blood Sugar, Physical Injuries, Blood Flow Reduction.

Introduction

Orthopedic diseases are related to injuries and diseases that affect the musculoskeletal system. The musculoskeletal system includes bones, muscles, joints, ligaments, nerves, tendons, and other connective tissues. Injury or chronic disease in any of these parts should be examined by an orthopedic specialist and treatment measures should be taken for it [1-3].

Symptoms of orthopedic diseases

The symptoms of orthopedic diseases are very wide and depend on the type of disease and the affected area. But

in general, the following symptoms can be considered among the symptoms of orthopedic problems:

- Deformity and abnormal appearance of the joint;
- ➢ Joint pain and swelling;
- Joint stiffness and limited movement [4];
- Muscle spasm;
- Numbness and tingling;
- Mild to severe pain that can be dull, aching, tingling, or cramping;
- Swelling of the affected area [5];
- Redness of the skin in case of infection or inflammation (Figure 1).



Figure 1. Symptoms of orthopedic diseases

Types of orthopedic diseases

There are different types of orthopedic diseases. Some of them affect the bone, and others affect the joint, tendon, muscle, or nerve [6].

1. Arthritis

Arthritis has different types and causes limited movement, pain and swelling. Arthritis affects the joints

and surrounding connective tissues [7]. The area where two or more bones meet is called a joint. Swelling and redness of the joint is a sign of arthritis. This disease is more common in the elderly and affects women more than men. There are more than 100 types of arthritis. The most common ones are:

- ➤ Arthritis;
- Joint rheumatism;

- ➢ Gout;
- ➤ Lupus;
- Scleroderma;
- Ankylosing spondylitis [8];
- Juvenile rheumatoid arthritis.

The causes of each type of arthritis are different. Arthritis is caused by joint wear and tear. Diseases such as lupus and rheumatoid arthritis appear due to the immune system attacking the tissues of the body. The accumulation of crystals in the joints causes gout [9].

Arthritis or osteoarthritis

Arthritis is one of the most common types of arthritis. This disease causes joint pain and inflammation. Arthritis is a chronic joint disease that gets worse over time and is usually more common in older people [10]. It may affect any joint, but it most commonly affects the joints of the hands, knees, hips, and spine. There are two primary and secondary types of arthritis. The cause of the primary type is not known. But the secondary type of the disease appears due to infection, damage or deformation. In this disease, the cartilage starts to break down. With the loss of cartilage, the end of the bone grows, which is called a bone spur [11]. People who have joint damage or are overweight are more prone to this disease. Treatment options for arthritis include exercise, physical therapy (Figure 2), weight loss, medication, injection of joint lubricant, or surgery.



Figure 2. Arthritis or osteoarthritis

Arthritic rheumatism

Rheumatoid arthritis or rheumatoid arthritis is a chronic disease that causes joint inflammation. Sometimes the inflammation is so severe that it affects the function of the joints and other parts of the body. For example, joint rheumatism in the hand causes deformity of the fingers and makes it difficult to work with the hand [12]. A type of this disease called juvenile rheumatoid arthritis occurs in people under 16 years of age and its symptoms last for more than 6 weeks. But rheumatism is chronic in adults and is considered an autoimmune disease. The body's immune system attacks healthy cells and causes joint inflammation [13].

Lumbar disc herniation

There are discs between the vertebrae of the spine. Their center is soft and jelly-like, and the outer part is harder. Sometimes the disc slips or tears. If the outer part of the disc tears and a part of it protrudes, the person has a lumbar disc herniation [14]. This condition causes pain, numbness or weakness in the legs and arms. A lumbar disc herniation can occur in any part of the spine. But this condition usually occurs in the lower back. High weight, hard jobs with high physical activity, smoking, frequent driving and inactivity increase the possibility of disc herniation. Analgesic, neuropathic and muscle relaxant drugs are prescribed for pain relief [15].

Back ache

Back pain is one of the common problems in people. Sometimes the pain is mild and vague and sometimes severe and debilitating. Pain in this area can affect performance and make movement difficult. Back pain has many causes and its cause must be diagnosed by an orthopedic specialist. The following are among the most important causes of back pain:

- Vigorous activity or poor back posture;
- Injury;
- Pressure on the vertebrae;
- Infection;
- Tumor growth;
- ➢ Obesity;
- Weak back muscles;
- ➤ Muscle spasm [16];
- ➢ Sprains;
- Ligament rupture;
- Stenosis of the spinal canal;
- Lumbar disc herniation;
- Problems such as arthritis or fractures.

Spinal stenosis

Spinal stenosis is a condition in which the space inside the spine is narrow and puts pressure on the spinal cord and spinal nerves. Its symptoms include pain, tingling, numbness and muscle weakness. Of course, some of this disease have no symptoms. Injury caused by arthritis causes bone spurs and narrowing of the spinal canal. Disc herniation, thickening of ligaments, tumor and damage to the spine are other causes of this condition. If the spinal canal stenosis is severe, the only way to treat it is surgery [17]. Of course, the arthritis problem cannot be solved with surgery and the back pain will probably continue.

Spinal cord cancer

In this condition, the tumor grows in the spinal canal or the bones of the spine. If the cancer has appeared in the spinal canal, it is called spinal cord tumor or intra dural tumor. The symptoms of spinal cord cancer include pain at the tumor site, back pain, less sensitivity to pain, heat and cold, reduced bowel and bladder function, and difficulty walking [18].

Heel spur

Another orthopedic disease is a heel spur, which occurs when a bone grows in the heel area. There is a long strip of connective tissue on the sole of the foot. Sometimes running, wearing inappropriate shoes and being overweight cause stretching of this tissue. Over time, the body builds new bone to respond to this inflammation, and the person suffers from heel spurs. The doctor may prescribe anti-inflammatory drugs for treatment. Appropriate shoes and corticosteroid injections help relieve this condition. In severe cases, surgery is recommended.

Kyphosis or humpback disease

The spine is normally seen as straight. But in people with kyphosis, the spine bends forward in the upper part and becomes rounded. This condition is also called hump. In radiography, the curvature angle of the spine is checked. Normally, this curvature should be 20 to 45 degrees, but in these patients there is more than 50 degrees of curvature. Congenital problems such as neural tube defects, neuromuscular problems, metabolic

problems and Scheuerman's disease can cause kyphosis. If the curvature is more than 75 degrees, the only treatment is surgery (Figure 3).



Figure 3. Kyphosis or humpback disease

Symptoms of diabetic foot disease

Diabetic foot disease may cause many symptoms for the patient, and it is very important for the patient to know its early symptoms, because early diagnosis is necessary to prevent serious complications. In the early stages of this condition, when the wound occurs, the person does not have sensation in the leg and does not feel the pain. Also, the patient does not feel any pressure, heat or cold. In general, the initial symptoms of diabetic foot are:

- Weakness or loss of feeling in the legs;
- Numbness and tingling sensation in the legs;
- Appearance of sores or pimples without pain;
- Discoloration of the skin of the feet;
- Change in foot skin temperature;
- Painful tingling sensation.

In more dangerous stages, when the wound does not heal and gets worse, there is a disturbance in the blood vessels and blood supply of the leg. Therefore, the diabetic foot causes numbness and numbness of the foot and infection or non-healing of the foot wound. As a result, if the inflammation or ulcer of the diabetic foot becomes infected, the following symptoms may appear:

Uncontrolled increase in blood sugar level;

- \succ High temperature in the legs;
- Bad foot odor that is hard to get rid of;
- Edema (fluid retention) and leg swelling;
- Formation of pus and abscess in cases of open leg wounds;
- Atrophy of the skin (dryness) and absence of pulse in the leg.

The most effective way to prevent these problems and reach this stage is to control your diabetes and blood sugar. It can be said that among the various injuries that the foot may experience as a result of diabetes, nerve damage is the worst and most severe. So no matter what, you should take steps to improve diabetes. Controlling blood pressure and cholesterol are other things that must be paid attention to. Lipid or fat compounds are among the things that have an indirect but important effect on the state of neuropathy. On the other hand, exercising and eating healthy and having proper physical activity and weight control can neutralize the negative effects of blood sugar to a great extent and also help to improve it, and in this way, cardiovascular problems and cholesterol can be eliminated to a large extent. In the same situation, people who are obese or overweight are

more likely to suffer from neuropathy. Apart from the problem of neuropathy, the problem of arthritis and various leg pains are also added to the problems caused by blood sugar, which in addition to reducing the quality of life, make the treatment more difficult. The best way for people with diabetes is to be able to Prevent the process of nerve damage from even starting. Better and more accurate diagnosis, more effective treatments and better cooperation between the patient and the doctor can practically prevent the occurrence of problems related to diabetes, especially neuropathy. With this, the patient is no longer forced to undergo complex and difficult treatments and everything is resolved much more easily. Most diabetic patients complain of burning pains, especially in the area of the soles of the feet and on the feet, often the symptoms are bilateral and the patient feels as if he is walking on stone rubble with cloudy slippers. Sometimes, the burning of the legs is so severe that it severely reduces the quality of life and the person feels like he is walking on hot coals. In these cases, the patient's problem may not be solved by sugar control only, and the doctor needs to prescribe special drugs to treat neuropathic pain.

Diabetic people with what conditions are more exposed to this complication?

Although most diabetics are at risk of developing diabetic foot, some people are more likely to develop it. Among the people who are more at risk of this complication are:

- ➢ Fat people;
- People who do not check and control their blood sugar, pressure and fat regularly;
- ➤ Smokers;
- People who do not observe foot hygiene;
- People whose leg veins have insufficiency;
- People who have limited joint movements;
- People whose foot shape has changed due to pressure;

People who have retinal problems and blurred vision due to diabetes.

Usually, this complication can be prevented, but if the disease is not followed up, the possibility of amputation increases. In diabetic patients, due to impaired insulin secretion, the cells cannot use the sugar inside the blood vessels. As a result, the amount of glucose inside the blood vessels is high, but the amount is very low in the cells. As a result of the high level of glucose in the blood vessels, there is a disturbance in the blood supply to the feet, which increases the possibility of suffering from this complication.

Diagnosis

Medical examinations and tests must be performed to diagnose diabetic foot disease. First, the doctor asks questions about the signs and symptoms of the disease. Then the legs are checked and examined for blood circulation and the problem area. In the next steps, it examines the blood completely by prescribing a CBC test. If the number of white blood cells is not regulated, it is a sign of infection. The patient's blood sugar level is also measured. X-rays are taken to accurately check the extent of foot damage due to infection. Ultrasound, angiogram, etc. may also be used for additional tests.

Diabetic foot treatment

The treatment of this disease depends on its severity and damage. The first step to prevent the development of diabetes complications, including diabetic foot, is to control blood glucose, blood pressure, and cholesterol levels. Diabetic foot treatment options include:

Non-surgical treatment

Non-surgical treatment is usually started in non-acute stages where the foot tissue has not been damaged yet. Non-surgical treatment options include:

- Sterilizing wounds with disinfectant solutions;
- Drainage of pus or abscess;
- Wound healing;

- Infection control by administering oral or injectable antibiotics;
- Prescribing medication to treat symptoms of peripheral arterial disease and increase blood flow in the legs;
- Lifestyle modification, including wearing comfortable and medical shoes, and quitting smoking (Figure 4).



Figure 4. Diabetic foot treatment

Pressure reduction

One of the best ways to treat this disease is to reduce the pressure and remove the pressure. In a diabetic foot ulcer, there is abnormal and excessive pressure, which must be corrected before the ulcer heals. For this purpose, there are several ways to reduce pressure, including complete rest, refraining from putting weight on the leg, using a cane or walker, as well as using orthopedic devices such as medical shoes. It should also be noted that this action, i.e. pressure reduction, should continue even after the wound has healed.

Local treatment

Local treatment steps for leg ulcers may include the following:

- Clean and bandage wounds;
- Using ointments such as salicylic acid to remove dead and thick tissues of the foot skin;

- Use of topical antibiotics such as neomycin and gentamicin;
- ➤ Use of topical heparin ointments.

In the following, we will examine some topical methods.

Medicines and antibiotics

One of the other ways to treat this wound is to use antibiotics, anti-platelet and anti-coagulants to prevent infection. Oral antibiotics such as streptococcus and amoxicillin are commonly used for people with mild or moderate diabetic foot ulcers. But for patients with diabetic foot ulcers who have advanced infections, antibiotics are used in hospitals and under the supervision of a doctor and group therapy.

Ointments

To heal pain and wounds caused by this disease, ointments can be used with the prescription of a specialist doctor, which include fusidic acid ointment (suitable for treating skin infections), tetracycline ointment (antibiotic ointments), vaseline (to moisturize the wound bed) and also reduce inflammation) and alpha ointment (for rapid reduction of wound inflammation).

Surgical treatment

When non-surgical treatment fails, the doctor will resort to surgical treatment, which may include:

- Removal of rotten or dead leg tissue;
- Amputation of a part of the leg or the whole leg;

Leg vascular surgery to improve blood flow in the lower limbs.

Diabetes and joint pain

Diabetes and joint pain are considered independent conditions. Joint pain may be a response to an illness, injury, or arthritis. It can be chronic (long-term) or acute (short-term). Diabetes is caused by the body not using the hormone insulin properly or its insufficient production, which affects blood sugar levels. Diabetes is associated with a wide range of symptoms and complications. According to the Center for Disease Control and Prevention, 47% of people with arthritis also have diabetes. There is an undeniably strong connection between these two conditions (Figure 5).



Figure 5. Diabetes and joint pain

Familiarity with diabetic arthropathy (joint inflammation).

Diabetes can damage the joints, a condition called diabetic arthropathy. Unlike pain caused by an immediate impact, arthropathy pain occurs over time. Other symptoms include:

- Thick skin;
- Changes in the leg;
- Painful shoulders;
- Carpal tunnel syndrome.

A joint is where two bones meet. When a joint wear out, the protection it provides is lost. Joint pain caused by diabetic arthropathy appears in different forms.

Charcot joint (a joint that does not feel pain and may degenerate): Charcot joint occurs when diabetic nerve damage causes joint destruction. Arthropathy, also called neuropathy, is seen in the feet and ankles of people with diabetes. Nerve damage is common in the diabetic foot, which may lead to Charcot joint. Loss of

nerve function leads to numbness. People who walk on numb feet unknowingly twist and injure their ligaments. This puts stress on the joints, which can eventually wear them down. Severe injury leads to deformity in the foot and other affected joints. Bone deformity in the Charcot joint may be prevented by early intervention. Charcot joint, also known as neuropathic arthropathy, occurs when the joint deteriorates due to nerve damage. Nerve damage is a common complication of diabetes. Charcot joint or neuropathic joint is a progressive disease of the skeletal system characterized by symptoms such as dislocation of joints, pathological fractures and debilitating abnormalities. This disorder is caused by the gradual destruction of bones and soft tissues in the weight-bearing joints of the body.

The symptoms of this disease are:

- Painful joints;
- Swelling or redness;
- ➤ Numb;
- An area that is warm to the touch;
- Change in the appearance of the legs.

Osteoarthritis (OA) and type 2 diabetes

Osteoarthritis (OA) is the most common form of arthritis. It may be caused or aggravated by being overweight, which is a common problem in people with type 2 diabetes. Unlike Charcot joint, OA is not directly caused by diabetes. Conversely, being overweight increases the risk of type 2 diabetes and OA. Osteoarthritis occurs when the cushioning between joints (cartilage) wears away. This causes the bones to rub against each other, resulting in joint pain. While joint wear and tear is normal to some extent in older people, excess weight accelerates this process. You may notice increasing difficulty moving your limbs as well as swelling in your joints. The hip and knee are the most common areas involved in OA. The best way to treat OA is weight management. Excess weight puts more pressure on the bones. It also makes diabetes harder to control. So losing a few extra pounds cannot only reduce

chronic joint pain, but may also reduce other symptoms of diabetes. According to the Arthritis Organization, losing 6 extra pounds may reduce knee pain by 50 percent. to give Regular exercise can be more effective than weight maintenance. Physical movement also helps keep your joints moving. As a result, you may feel less pain. Your doctor may prescribe pain relievers when joint pain from OA becomes unbearable. Surgery, such as a knee replacement, may be needed in severe cases.

Rheumatoid arthritis (RA) and type 1 diabetes

Just as there are different types of diabetes, joint pain associated with arthritis comes in many forms. Rheumatoid arthritis (RA) is an inflammatory disease caused by an autoimmune disease. While swelling and redness may be present, unlike OA, RA is not caused by excess weight. In fact, the exact causes of RA are unknown. If you have a family history of autoimmune disease, you may be at risk for RA. Type 1 diabetes is also classified as an autoimmune disease, which explains the possible link between the two. These conditions also share inflammatory markers. Both RA and type 1 diabetes cause elevated interleukin-6 and Creactive protein levels. Some arthritis medications can help lower these levels and improve both conditions. Pain and swelling are the primary characteristics of RA. Symptoms can come and go without warning. There is no cure for autoimmune diseases like RA. Therefore, the focus of treatment is to reduce the inflammation that causes these symptoms.

Newer RA medications include

- Etanercept (Enbrel);
- Adalimumab (Humira);
- Infliximab (Remicade).

These three drugs may be helpful in reducing the risk of developing type 2 diabetes. Type 2 diabetes is associated with inflammation, which these drugs help manage. According to the Arthritis Foundation, in one study, the risk of developing type 2 diabetes was lower

for those who used these drugs. Diabetic stiff hand syndrome (DSHS) is a painless disorder that can limit hand function in people with diabetes. These patients have stiffness in their hand and limited mobility of the hand causes their daily activities to be affected. Who is at risk of suffering from diabetic hand stiffness? Normally, this type of syndrome can affect between 8 and 50% of people with diabetes, although this complication has also been seen in type 2 diabetes. The signs and symptoms of this condition are:

- Thickening of the skin of the hand;
- Hardness and waxiness of the skin of the hand;
- Stiffness starting from the little finger and then spreading;
- Being unable to bend or open the fingers;
- > The range of motion of the hand decreases.

Treatment methods for diabetic stiff hands

Other things that can help improve and reduce the symptoms of this condition are:

1. Accurate control of blood sugar

Close blood sugar control is the best way to prevent or slow the progression of DSHS.

2. Therapeutic exercise

Another effective solution in this regard is performing therapeutic exercises such as throwing or catching a ball, which can make your hands strong and flexible.

3. Cold therapy and heat therapy

Heat loosens tight tendons, while cold reduces pain and swelling. You can consult your doctor to do this.

4. Use of painkillers

If needed, anti-inflammatory drugs such as ibuprofen can help.

The cause of diabetic stiff hands

DSHS is more likely to occur in people who have had diabetes for a long time. It is possible that high blood sugar causes glycosylation, a process in which glucose molecules attach to protein and cause stiffness. In addition to glycosylation, diabetic neuropathy (nerve damage) and diabetic micro angiopathy (blood vessel dysfunction) can also contribute to DSHS.

Raw	Study	Year	Severe O	Severe COVID-19 COVID-19			Proportion Wight 98%		Weight %	
			Yes	No	Yes	No				
1	Nurmeksela et al.	2020						0.85	[0.39 - 1.02]	6.02
2	Hosseini Khalili et al.	2008					· · · ·	0.83	[0.42 - 1.01]	5.92
3	Shakiba et al	2022						0.74	[0.55 – 1.02]	5.65
4	Karimzadeh	2021						0.91	[0.48 - 1.08]	6.03
Heterog	eneity t²=0.00, l²= 0.00, H²=1.0	•	0.98	[0.20 - 1.08]						
Test of 6	θ= Θ, Q (4) =3.99, P= 0.66									
1	Mirakhori et al.	2022						0.68	[0.52 – 1.06]	6.02
2	Najafi et al.	2018					· · · · · ·	0.74	[0.31 - 1.08]	5.92
3	Kalantari et al	2020						0.89	[0.19 – 1.01]	5.65
4	Tahemia et al	2022					· · · ·	0.90	[0.29 – 1.02]	6.03
	Heterogeneity	•	0.98	[0.20 – 1.06]						
	Test of Θ=									
1	Karampela et al.	2020						0.92	[0.39 – 1.06]	5.03
2	Montani et al.	2004						0.87	[0.54 - 1.02]	6.02
3	Goyal et al.	2020						0.88	[0.63 – 1.01]	5.57
4	Aminzadeh	2015					· · · ·	0.60	[0.25 - 1.08]	6.13
	Heterogeneity	•	0.95	[0.22 - 1.07]						
	Test of Θ =									

Figure 6. Forest plot showed Systematic Review of Therapeutic Care in Diabetic Patients with Orthopedic Problems

Diabetes and joint damage

Arthropathy is a disease that causes pain in the joints of the body. If diabetes causes arthropathy in a person, it is also called diabetic arthropathy. In the long term, diabetes causes damage to the joints between the knees. In diabetic patients, the feeling of pain decreases over time, and in many cases, the person does not have the ability to understand the pain and discomfort in the joint area. The loss of nerve function in diabetic patients causes the destruction of joints and changes in the shape of the legs.

Diabetes

Diabetes is a disease that causes pain in the joints and different parts of the body over time. People who have diabetes suffer from arthritis and joint pain compared to other people, and if it is not controlled and treated, it causes problems in the joints. Diabetes in two types, normal and advanced, causes damage to joints and broken bones.

Diabetes diseases

Diabetic hand syndrome

Diabetic hand syndrome, which is also called diabetic chiroarthropathy, is a disorder in which the skin of the hands becomes thick and shiny and eventually limits the movement of the fingers. It is more common in those who have had diabetes for a long time.

Osteoporosis

Osteoporosis is a disorder that leads to weakening of bones and increases the possibility of fractures. People with type 1 diabetes are more at risk of osteoporosis.

Arthritis

Arthritis is a joint disorder that wears down bone cartilage. This condition can affect any joint in the body. People with type 2 diabetes are more prone to arthritis due to factors such as obesity. Obesity is more effective than diabetes in getting arthritis.

Dupuytren's contracture

This disease is a deformity in which one or more fingers bend towards the palm. This condition is caused by thickening and scarring of the connective tissues of the palm and fingers. Dupuytren's contracture is common in people who have had diabetes for a long time, which is probably caused by the metabolic changes caused by diabetes.

Frozen shoulder

Frozen shoulder is a condition characterized by shoulder pain and reduced range of motion. Usually, this condition affects only one shoulder. Diabetes is one of the risk factors for frozen shoulder.

1	Karampela et al.	2020						0.92	[0.39 – 1.06]	5.03
2	Montani et al.	2004						0.87	[0.54 – 1.02]	6.02
3	Goyal et al.	2020						0.88	[0.63 – 1.01]	5.57
4	Aminzadeh	2015						0.60	[0.25 – 1.08]	6.13
Heterogeneity t²=0.02, l²= 0.00, H²=1.00							•	0.95	[0.22 – 1.07]	
Test of θ= θ, Q (4) =5.55, P= 0.74										
1	Barzideh et al.	2012						0.84	[0.27 – 1.08]	6.08
2	Mileski et al.	2020						0.76	[0.36 – 1.06]	5.82
3	Borba et al.	2020						0.69	[0.28 – 1.05]	5.85
4	Gadlage et al.	2010						0.82	[0.34 – 1.02]	6.09
Heterogeneity t ² =0.01, l ² = 0.00, H ² =1.00						٠	0.0.95	[0.29 – 1.06]		
Test of ⊖= ⊖, Q (4) =3.49, P= 0.80										

Figure 7. Forest plot showed Systematic Review of Therapeutic Care in Diabetic Patients with Orthopedic Problems Based on Radiological Points in ICU

Weight Loss

The best way to treat diabetes and prevent joint damage is to lose weight. Weight gain is a factor that causes a lot of pressure on bones and joints. For this reason, joint damage and knee arthritis can be prevented to some extent by losing weight.

Appropriate diet

Proper diet is another solution that prevents joint damage. Adhering to a standard and suitable diet helps to provide the substances needed by the body properly. In addition to controlling diabetes, a proper diet helps to strengthen bones and joints due to eating quality food.

Calcium

Consuming calcium is a good solution to prevent joint and bone damage. Calcium and vitamins strengthen bones and joints by providing the necessary substances. If the bones and joints have high strength and resistance; They are less prone to damage and bear more pressure.

PET/CT imaging

This imaging method is a combination of computed tomography and positron emission tomography. PET scan of active cancer cells and CT scan shows its exact location. The treating doctor prescribes PET/CT test based on disease symptoms, disease records and other tests. This method is not suitable for the signs and symptoms of lymphoma (a type of cancer that usually starts in the body's lymphatic system).

Reasons for the importance of blood glucose levels for PET/CT imaging

To perform this type of imaging, radioactive sugar (fluorodeoxyglucose) is injected to better display cancer cells.

1	Hosseini et al.	2008					•	0.56	[0.11 – 0.66]	1.55
2	Ibrahim et al.	2020						0.26	[0.15 - 0.48]	4.33
3	Kalantari et al.	2020					· · ·	0.48	[0.19 - 0.55]	6.77
4	Rothan et al.	2020						0.24	[0.17 - 0.29]	3.03
Heterogeneity t ² =0.05, I ² = 0.07, H ² =0.78								0.22	[0.03 - 0.32]	
Test of $\Theta = \Theta$, Q (4) =3.01, P= 0.11										
1	Michler et al.	2021						0.77	[0.39 - 1.06]	3.11
2	Chiusano et al.	2020					ļ	0.65	[0.54 - 1.02]	6.05
3	Delin et al.	2020					•	0.73	[0.63 - 1.01]	4.06
4	Gadlage et al.	2010						0.41	[0.25 - 1.08]	7.03
Heterogeneity t ² =0.12, I ² = 0.01, H ² =0.99							ļ	0.48	[0.22 - 1.07]	6.03
Test of $\Theta = \Theta$, Q (4) =1.45, P= 0.14										
1	Samiei et al.	2021						0.84	[0.27 - 1.08]	6.08
2	<u>Stoessl</u> et al.	2020					-	0.76	[0.52 - 0.22]	5.82
3	Uzunova et al.	2020					•	0.11	[0.54 - 0.89]	5.85
4	Wang et al.	2020						0.39	[0.12 - 0.99]	6.09
Heterogeneity t ² =0.21, I ² = 0.04, H ² =0.39							0.77	[0.19 - 1.00]		
Test of $\Theta = \Theta$, Q (4) = 3.35, P = 0.34										

Figure 8. Forest plot showed Systematic Review of Therapeutic Care in Diabetic Patients with Orthopedic Problems Based on Radiological Points in OR

Diabetes overshadows PET CT scan imaging in two ways: If the blood sugar level is high, the cancer cells do not receive enough radioactive sugar (due to high sugar intake). As a result, it does not display cancer cells well. The high level of insulin encourages the tissues and cells to receive radioactivity and ultimately leads to the inaccuracy of the test. Due to the importance of blood sugar levels in pet scan imaging tests, blood sugar tests are always performed before injecting radioactive sugar. Radiotracers are injected into the body through intravenous injection or fingertip injection. The standard level of blood sugar should be between 4 and 10 (mmol/liter), blood sugar level higher than 12 (mmol/liter) will delay the test.

Conclusion

Diabetes is a lifelong disease in which the amount of sugar in the body is not in balance and it has different types. Among the symptoms of this disease, we can mention increased thirst, frequency and frequency of urination, as well as fatigue. There are two main types of diabetes. Type 1 diabetes, in which the body does not produce enough insulin, and type 2 diabetes, in which the body may not produce enough insulin or the cells of the body may not react to the produced insulin and not absorb it. The body's ability to produce insulin or its excessive consumption by body cells causes an increase in blood sugar, which is also known as hypoglycemia. If the blood sugar is high for a long time, the blood sugar can damage the organs or tissues of the body such as the heart, blood vessels, nerves, kidneys and eyes. Among the reasons that may contribute to the development of different types of diabetes, we can mention the family history of this disease, overweight, physical inactivity and unhealthy diet. Feet in diabetes may be damaged in two ways.

Diabetes may affect blood flow or cause nerve damage. Ulcers caused by diabetes may be associated with neuropathy (nerve damage) or arterial disease (poor blood circulation). These two factors can increase the risk of amputation due to leg ulcers by 80%. Podiatry plays an important role in controlling foot ulcers and by providing treatments such as wound removal, dressings and pressure reduction, it can accelerate the healing of wounds and reduce the risk of amputation in diabetic patients. Arthropathy is a disease that causes chronic pain and problems in the joints. If a person suffers from arthropathy as a result of diabetes, their disease is called diabetic arthropathy. If diabetes is in advanced stages and its treatment takes a long time, it can lead to joint diseases. For example, the destruction of the joints between the knees is one of the common effects of longterm diabetes. As a result of this disease, the knee bones wear out due to the lack of joints. These wear and tear gradually causes severe pain in the knee. People with diabetes after some time, their nerve function to send pain to the brain is disturbed; Because of this, after a while, they will not be able to understand the pain.

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