Original Article

Principles Of Treatment Staff Care For Patients With Diabetes, Chronic Abdominal Pain And Hypertention In ICU Based On Pharmacology And Radiological Points: A Systematic Review

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Abstract

This study systematically investigated patients with diabetes, chronic heart pain, and lower limb bone fractures based on pharmacology and radiology. Osteoporosis or osteoporosis is actually a disease in which bone mass is low and its tissue is weak and subsequently becomes very fragile. This disease is the most common metabolic bone disease. Osteoporosis is very common in postmenopausal women and 30% of them suffer from fractures caused by this problem. Osteoporosis is a painless disease until a fracture occurs. This disease is usually diagnosed after a bone fracture, especially in the areas of the neck of the femur and lumbar vertebrae. Therefore, the absence of pain does not mean the absence of osteoporosis. Severe osteoporosis may be present even without pain with a fracture. Fracture in such conditions can happen even by itself or with mild trauma cases such as a simple fall. In addition to old age and menopause, other factors can act as a risk factor for osteoporosis, including some underlying diseases and medications. Among these diseases that because secondary osteoporosis is diabetes (type 1 and 2), hyperthyroidism, hyperparathyroidism, pregnancy, smoking and alcohol consumption, malnutrition, chronic liver and kidney disease, vitamin D deficiency, AIDS, hemophilia and Arthritic rheumatism and... Diabetes is a common disease with a clear connection between type 1 and osteoporosis. Diabetes is the most common metabolic disease, characterized by increased blood sugar, impaired carbohydrate, fat and protein metabolism, and as a result, defects in insulin secretion or insulin action are created. The chronic nature of diabetes affects the patient's body, mind, and personal and social functioning. Diabetes is a serious public health problem that threatens the quality of life of patients and can lead to acute and chronic complications and is an important cause of disability and death in many countries.

Keywords: Diabetes, Chronic Pain, Fractures of lower limb bones, Pharmacology, Radiology.

Introduction

According to studies, the prevalence of diabetes in Iran is also high. Based on the prediction that the World Health Organization experts have made regarding the prevalence of type 2 diabetes in Iran, they have estimated the prevalence

of 6.8%, based on which the country's diabetic population will reach 5.125.000 within the next 15 years [1-3]. The nature of this disease is very complex and some factors can affect its control. In this regard, the participation of diabetic patients in the process of treatment and management of the disease by themselves is very important. One of the reasons for the lack of success and achieving favorable treatment results in diabetic patients is the lack of patient participation in diabetes treatment [4-6]. Because patients with diabetes need to be empowered in the field of new lifestyle skills and psycho-social management of the disease in order to control and prevent or delay its complications [7-9].

Diabetic patients must make serious decisions regarding nutrition, physical activity, medication, blood glucose monitoring, and stress management. They must also work effectively with their health care system, family members, friends, and colleagues to get the support they need to manage their illness [10-12].

Psychosocial management is an important and effective structure in psychology because it is related to the willingness and ability of people (patients) to participate in different behavioral challenges such as preventive behaviors and disease management. In recent years, the concept of empowerment has become a very familiar concept in various health texts [13]. The main difference between this training program and traditional training programs is that instead of being considered a technique or strategy, this method plays the role of a guide for patients and health care workers. Considering the nature of diabetes and the need for self-care in patients, the empowerment model can be a suitable framework for educational interventions in the above field [14-16].

The process of empowerment includes three key concepts of information knowledge, behavioral skills and responsibility. It is believed that diabetic patients should experience self-care and directly accept the responsibility of facing their disease because their informed decision will have a great impact on their health. Anderson 1 believes that the goal of the empowering approach to diabetes education is to help patients make informed choices about self-management of their disease, and they present a four-step behavior change model:

1- Understanding and recognition of problem areas by the patient;
2- Examination of accompanying emotions with these problems;
3- Designing a set of goals and strategies to overcome the obstacles to reach those goals.
4- Determining the motivation of patients to make a commitment to the behavior change plan.

The diabetes assessment tool designed by Anderson et al. It follows this model of behavior change, and in its areas such as psycho-social support and stress management are included to evaluate capability, because these areas are considered to be major obstacles or facilitators of positive self-report adaptation in diabetic patients [17-19]. Patient empowerment is one of the useful approaches in diabetes education. It aims to provide a combination of diabetes awareness, self-care skills, and self-awareness of needs and goals [20]. The empowerment model, emphasizing the effectiveness of the role of the individual and other family members in motivational, psychological and behavioral dimensions, can be considered as a suitable approach in improving self-care and control of type 2 diabetic patients [21].

Empowerment structures for diabetic patients are intended to clearly recognize the patient's status in social support, goal setting for the disease and coping with ineffective emotions and be considered as a measure of psycho-social self-efficacy and finally to compile successful educational and clinical interventions to control and self-care of this disease. Empowerment emphasizes an approach that tries to improve patients' ability to understand and actively influence their lives and health. Based on this, this study studied the status of diabetes ability index and its related factors in type 2 diabetic patients in Sirjan city [22-24]. The research findings showed that the scope of setting and achieving goals is the most important factor in the score of diabetes ability index. This factor measures the patient's perceived ability to set realistic goals and overcome obstacles to achieve their goals. Along with the findings of this study, other studies in this field have also shown that in diabetes, goal setting through promoting self-efficacy and self-esteem in diabetic patients is an important element of empowerment and is related to self-care of the disease. Studies have shown that self-esteem brings better self-control and this self-control can lead to increased self-efficacy and eventually empowerment in diabetic patients [25-27].

Search strategy and selection of articles

Search in Scopus, Google scholar, PubMed databases and by searching with keywords such as "Patients with Diabetes", "Chronic Heart Pain", "Lower Limb Bone Fractures" and “Radiology Stereotypes” to obtain articles related to the selected keywords [28-30]. Case report articles, editorials, and articles that were not published or only an introduction of them were available, as well as summaries of congresses and meetings that were in languages other than English, were ignored. Only the original research articles that evaluated the effectiveness of different drugs in the treatment of COVID-19 using standard methods were studied (figure 1) [31].

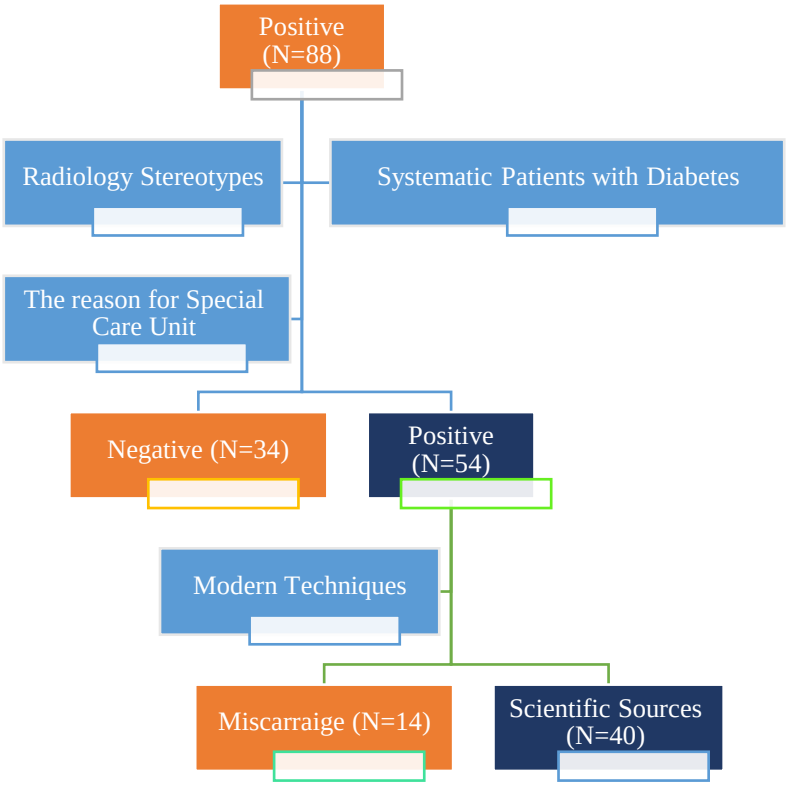

Figure 1. Flow chart of included subjects

The relationship between diabetes and osteoporosis

Most research shows that bone health is compromised when diabetes occurs. The key answer to this connection is the interaction between bone and insulin [32-34]. People with type 1 diabetes are more likely to develop osteoporosis. According to this decrease in bone density is due to the lack of insulin levels in these patients. Insulin increases bone density. Insulin can increase the absorption of amino acids and the production of collagen by affecting bone cells. Research shows that type 2 diabetes directly affects bone metabolism and density. On the other hand, due to the lack of physical and sports activities, they suffer from this decrease in bone density and osteoporosis [35-37]. Of course, some hypoglycemic drugs also lead to osteoporosis. Of course, on the other hand, the occurrence of diabetes complications with an increase in the probability of falling also leads to an increase in the risk of bone fractures (Figure 1). Due to the reduction of bone density in these patients, the probability of bone fractures is higher in these patients, and at the same time, in case of fracture, bone tissue repair is often delayed. In bone fractures, a lot of maintenance costs and the resulting disability are imposed on the health structure. Also, the mortality rate due to fracture has been reported up to 20% [38-40].

Figure 1. The relationship between diabetes and osteoporosis

Factors that increase the risk of fractures following osteoporosis

Country of residence, race, age 40-90, sex, weight, family history, history of previous failures, smoking, joint rheumatism, use of glucocorticoid drugs, alcohol use and secondary osteoporosis following type 1 diabetes, malnutrition, chronic liver disease, hyperparathyroidism [41-43].

Factors increasing the risk of fractures in diabetes

Lack of proper control of blood sugar, loss of vision and hearing, weakness in maintaining balance, due to leg ulcers and nerve damage and past strokes, low blood sugar and inactivity, taking some drugs (relaxing drugs, blood pressure control drugs), environmental factors, forgetfulness [44].

Screening

In type 2 diabetes patients, like other people, including: All women over 65 years old, women after menopause with risk factors for osteoporosis, including (low weight, long-term use of glucocorticoids, smoking and alcohol use, early menopause and family history of fractures following osteoporosis), secondary osteoporosis following type 1 diabetes, malnutrition, chronic liver disease, hyperparathyroidism, etc., it is recommended to perform a bone density test [45].

Important points in maintaining bone health

Currently, the basis of osteoporosis prevention in diabetic patients includes the same recommendations that are used to treat diabetes itself, i.e. lifestyle changes, including healthy eating and proper physical activity [46].

A healthy diet with plenty of calcium and vitamin D

Calcium is found in many foods, especially dairy products. About 1000 mg per day is recommended for most people [47-49]. Vitamin D is also produced when the skin is exposed to sunlight. Although many people are able to produce vitamin D naturally through sunlight, in many cases they suffer from vitamin D deficiency because they are less exposed to sunlight. For this reason, vitamin D supplements are necessary for them, especially in obese people who are at risk of vitamin D deficiency. In addition, the diet should be rich in unsaturated fats and Omega-3 fatty acids. Consuming nuts, especially almonds, hazelnuts, pistachios, and seeds, in moderation is beneficial. Of course, salt consumption should be limited [50-52].

Regular exercises to strengthen bones

Regular weight bearing and muscle strengthening exercises prevent osteoporosis, and by improving balance and better flexibility, the risk of falling and breaking bones is reduced. For this reason, exercise is very important and necessary for people with diabetes. On the other hand, exercise helps to reduce blood sugar levels. Walking at least 150 minutes

a week, in addition to improving blood sugar control due to weight loss and reducing the harmful effects on bones, improves bone density [53].

Healthy life

Quitting smoking and alcohol along with maintaining a normal weight not only helps to treat diabetes but also helps bone health [54].

Drug treatment

Since osteoporosis is one of the important complications of menopause, there are approved oral and injectable drug treatments for the prevention and treatment of osteoporosis in menopausal women and elderly men, which are prescribed by your doctor if necessary. From this group of drugs, they are currently also recommended for diabetic patients [55-57]. Calcium and vitamin D are very important for bone health and preventing osteoporosis. Adequate intake of calcium can be provided through diet. Otherwise, it should be prescribed through supplements. Vitamin D supplements are needed for people over 60 to protect against fractures. Minimizing the risk of falling for this purpose, any factor that disturbs the person's balance should be prevented including correction of reduced vision by an ophthalmologist, avoiding too much blood pressure reduction because it can cause dizziness and imbalance. Also timely treatment of sensory disorder in the legs. Important recommendations to prevent falls include:

1- Wearing appropriate shoes (preventing neuropathy and diabetic foot ulcers),
2- Installing handrails and railings in the bathroom, staircase, and clearing the path of diabetic elderly from hazards that cause the risk of falling. such as carpets that are not fixed in the way of commuting and installing lighted lamps in the living and commuting areas of these people,
3- Using a hip protector to prevent injury when falling [58].

Frequency of latent tuberculosis infection in patients with type 2 diabetes by tuberculin skin test

Mycobacterium tuberculosis (MTB) is the main cause of tuberculosis, which is the most important cause of death from an infectious agent worldwide. The World Health Organization estimates that about eight million people in the world are infected with active tuberculosis every year and nearly two million people die from this disease [59].

1 in 10 people infected with MTB may develop active TB infection during their lifetime. Tuberculosis has a global distribution and more than two billion people (about 30% of the world's population) are suspected of being infected with tuberculosis. Latent tuberculosis infection (LTBI) is an immune response to MTB antigens without symptoms of active tuberculosis, which can be diagnosed using two tests to evaluate the release rate of interferon gamma (IGRA) and tuberculin skin test (TST). To perform the TST test, 0.1 ml of purified protein derivative is used, and 48-72 hours later, the hardness diameter (induration) is measured at the PPD injection site. According to the report of the Centers for Disease Control and Prevention (Centers for Disease Control and Prevention), in patients with immunodeficiency, induration diameter greater than or equal to 5 mm is considered positive [60].

In people who have a certain disease such as diabetes, an induration diameter greater than or equal to 10 mm is reported as positive, and an induration diameter greater than or equal to 15 mm is considered positive in any person. The IGRA test shows how the body's immune system reacts to the mycobacteria that cause TB. A positive result means that the person has been infected with TB bacteria, and a negative test result means that the person's blood did not react to the test and there is probably no latent TB infection or TB disease. The IGRA test is the preferred method of testing for tuberculosis infection in people who have received the Bacille Calmette Guérin vaccine (BCG).

Some studies have shown that IGRA has higher sensitivity and specificity in the diagnosis of LTBI. Of course, some researchers also believe that IGRA does not have a higher sensitivity and specificity than TST in diagnosing LTBI. Tuberculosis and diabetes and the double burden caused by both of them are among the most basic global health problems. In 2020, the World Health Organization has reported 10 million cases of tuberculosis and 1.5 million deaths due to it. Tuberculosis remains a major public health problem [61-63]. Although the effort to control its epidemic has reduced its mortality and incidence, there are various factors that must be corrected to reduce the burden of the disease. Patients with diabetes are at a higher risk of developing latent tuberculosis into active tuberculosis. A diagnosis of

diabetes also increases the risk of progression from primary infection to active TB. A study of patients with diabetes showed that the risk of active tuberculosis was three times higher among those with hemoglobin A1c (HbA1c) levels greater than or equal to 7 than those with HbA1c levels less than 7.

There is an alarming increase in the incidence of diabetes worldwide. Uncontrolled diabetes can lead to changes in the immune system and increase the risk of susceptibility to infections such as mycobacterium tuberculosis [64]. In recent decades, the prevalence of diabetes has been increasing worldwide, and this trend is set to continue.

Estimates in 2019 showed that there are approximately 463 million people with diabetes worldwide, with 1 in 2 adults being undiagnosed (232 million), and this number is projected to increase by 51% to 700 by 2045 million people (9.10%) [65-67]. A systematic review of 13 observational studies found that a diagnosis of diabetes triples the risk of developing tuberculosis. Some studies have shown that the probability of multidrug resistant tuberculosis (Multidrug Resistant-TB) is higher in patients with diabetes, although there is still no explanation about this relationship. In fact, other studies have not shown an increased incidence of MDR-TB in patients with diabetes. Approximately 15% of TB cases worldwide may be associated with diabetes. The reported prevalence of diabetes among TB patients varies from 9.1% to 0.45% worldwide; Also, the reported prevalence of tuberculosis among patients with diabetes varies from 0.38% to 0.14%, and its average prevalence is reported as 1.4%.

The World Health Organization currently recommends two-way screening; Screening for diabetes in all patients with tuberculosis and vice versa. Recently, systematic review studies have shown that the control of hyperglycemic conditions has a favorable effect on the outcome of tuberculosis treatment, and on the contrary, poor blood sugar control (HbA1c above 7%) is associated with a delay in the clearance of sputum from the tuberculosis bacillus. Poor control of diabetes can lead to many complications, including increased susceptibility to infection (Figure 2). Diabetes increases susceptibility to tuberculosis through several mechanisms, including increased blood glucose and decreased cellular insulin, which has indirect effects on macrophage and lymphocyte function. Newly diagnosed TB and diabetes patients are more male and younger and also have lower HbA1c levels [68-70].

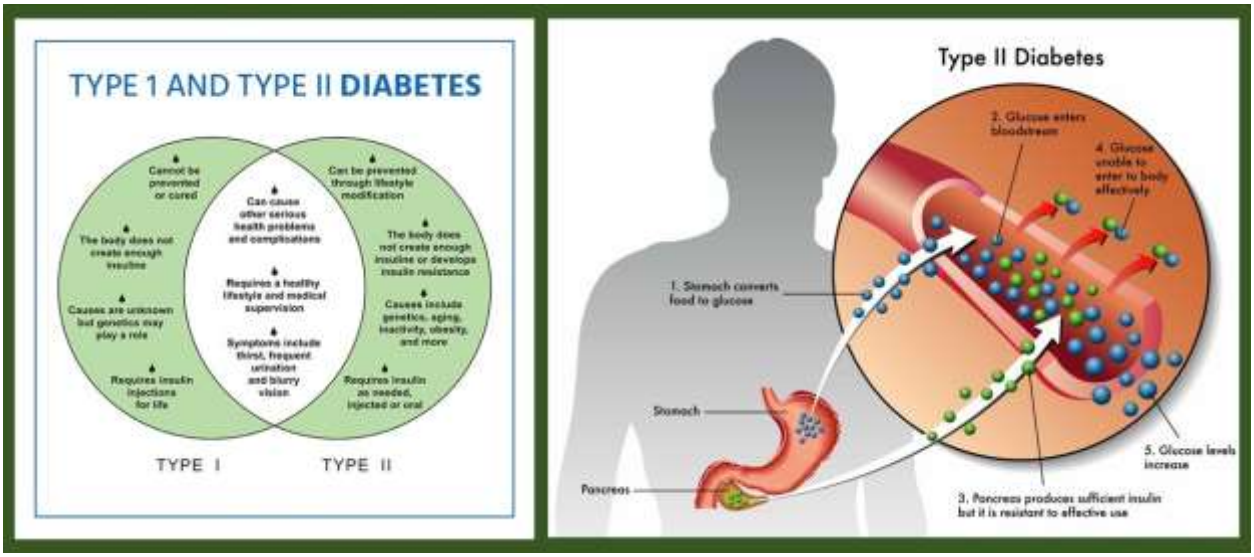

Figure 2. Frequency of latent tuberculosis infection in patients with type 2 diabetes by tuberculin skin test

According to chest X-ray findings, patients with tuberculosis and diabetes have more extensive lesions in their lungs, they often have multi lobar disease, and holes are frequently observed in their lungs. Different studies have shown that the amount of bacteria in diabetic people is higher and it takes longer for their sputum culture to become negative and their sputum to be cleared of tuberculosis bacillus, and in diabetic people, the probability of tuberculosis activation and relapse and treatment failure doubles. In a cross-sectional study in India, the effect of body mass index (Body Mass Index) and diabetes on active and latent tuberculosis was investigated. Among people who were obese or overweight, the prevalence of latent tuberculosis in diabetic people was 12 times higher than in non-diabetic people

and 2.5 times higher than in people with normal weight; But the prevalence of latent tuberculosis in these people was the same as those who had less than normal weight. Body mass index (BMI) and diabetes were associated with newly diagnosed active TB but not with LTBI.

Diabetes put those who were obese or overweight at higher risk for developing active TB, and hyperglycemia was common among all those with active TB. These findings highlight the importance of screening in India to find people with diabetes and active TB. Diabetes can severely affect the control of tuberculosis, especially in areas with high prevalence of tuberculosis; In a systematic review and meta-analysis of studies published between 1980-2010, it has been reported that diabetes is associated with a 69% higher risk of death and increased risk of tuberculosis recurrence than non-diabetic people. Also, since 2010, several large cohort studies have reported adverse effects of diabetes on TB outcomes. Early screening to check the co-occurrence of tuberculosis and diabetes helps doctors in improving the outcome of tuberculosis treatment. According to the different statistics obtained in the studies, there is still a need for more studies to investigate the relationship between diabetes and latent tuberculosis.

The results obtained so far do not support the screening of latent TB in diabetic patients and the administration of prophylactic drugs, and more studies should be conducted to investigate the benefits of screening and prophylactic treatment in diabetic patients in TB endemic areas. Based on these findings, in the present study, the relationship between the frequency of latent tuberculosis in patients with type 2 diabetes in Khorram Abad city, Lorestan province in 2018-2020 has been investigated. In a study, 195 patients with type 2 diabetes mellitus were randomly examined, none of the patients had symptoms of active tuberculosis, and they were screened for latent tuberculosis by TST method. Of these, 115 patients were referred to measure TST results.

Tuberculosis has a global distribution and more than two billion people (about 30% of the world's population) are suspected of being infected with tuberculosis. Although about 90% to 95% of people infected with MTB do not develop active disease and remain asymptomatic, about 5 to 10% of infected people develop the active form of the disease. The main cornerstone in the control and prevention of tuberculosis in countries with a high burden of the disease, which is an epidemic, is early diagnosis and correct treatment of the disease; However, in countries with a low or moderate disease burden, more attention should be paid to latent tuberculosis infection. The prevalence of diabetes has been increasing in recent decades and is an important risk factor for tuberculosis. Although the efforts to control the tuberculosis epidemic have reduced the death rate from this disease and its incidence, there are several factors that need to be corrected to reduce the burden of the disease. Patients with diabetes are at a higher risk of developing latent tuberculosis into active tuberculosis. Many studies have been done on the relationship between diabetes and active tuberculosis, but information about the effect of diabetes on latent tuberculosis is limited. According to the results obtained so far, diabetes increases the risk of tuberculosis activation, and people with diabetes and latent tuberculosis may be targeted for the treatment of latent tuberculosis in order to prevent the activation of tuberculosis in these people. Tuberculosis and diabetes and the double burden caused by both of them are one of the most fundamental global health problems. In a cohort study conducted in England, the predictive value of a positive IGRA test for the relationship between diabetes and latent tuberculosis infection was 15.1, and more sensitive analyzes had similar results and even a higher predictive value (PR=1.29) was obtained.

A recent systematic review reviewed one cohort study and 12 cross-sectional studies. In the cohort study, the adjusted hazard ratio was 40.4, and in 12 cross-sectional studies, the overall odds ratio was 1.18. In a cross-sectional study in America, the prevalence of latent tuberculosis in diabetic patients was reported to be 9.5%, and the adjusted odds ratio was higher in diabetic patients than in non-diabetic individuals, but the probability of latent tuberculosis in pre-diabetic individuals was similar to non-diabetic individuals.

According to the different statistics obtained in the studies, there is still a need for more studies to investigate the relationship between diabetes and latent tuberculosis. The results obtained so far do not support the screening of latent TB in diabetic patients and the administration of prophylactic drugs, and more studies should be conducted to investigate the benefits of screening and prophylactic treatment in diabetic patients in TB endemic areas. Further studies on the relationship between diabetes and latent tuberculosis are needed, although most findings indicate that diabetes increases the risk of tuberculosis and its latent infection, and these findings suggest that the recognition and control of tuberculosis risk factors, including the control of diabetes, can greatly contribute to the control of tuberculosis. There are many research issues regarding the relationship between diabetes and latent TB. Most of the

available evidence about this relationship is obtained from cross-sectional studies, and those conducting such studies tend to prove the relationship between diabetes and latent tuberculosis and establish a cause and effect relationship between them.

Although, according to the information obtained from cross-sectional studies, the possibility that latent tuberculosis increases the risk of diabetes cannot be rejected. It is recommended to select a larger sample for future studies so that a larger number of people with latent tuberculosis can be screened and the possibility of comparing their health status and risk factors for active disease and blood sugar control is provided; The study sample should be selected so that most of the patients are available to measure the result of the tuberculin test and are not excluded from the study; Also, a control group should be considered as a control group to be selected and matched with the study subjects to compare the prevalence and incidence of tuberculosis and latent tuberculosis in diabetic and non-diabetic people and their risk factors between the two groups. If different people measure the diameter of induration in patients, the results will not be comparable, because there may be differences in the method of measuring the diameter of induration [71].

On the other hand, the cut off limit determined for a positive TST (indicating LTBI) is not a definite number and varies between countries or recommended guidelines. Due to the fact that not all patients came to check the results of the tuberculin test and some of them were excluded from the study, the sample size was reduced; For this reason, the correct estimate of the actual prevalence of latent tuberculosis in patients may not have been obtained. According to the results, we saw that 3 out of 115 people had a positive tuberculin test. It is possible that the patients were not randomly selected and bias occurred in the selection of patients; In such a way that people who have had diabetes for a longer period of time and have a weaker immune system have been examined and a false negative result has been obtained. Considering that TST has many false negative and false positive results, it can change the prevalence of LTBI.

The sensitivity of TST is reduced in immunocompromised patients compared to healthy subjects and may lead to research limitations in the assessment of LTBI. The two-stage tuberculin test, which becomes false negative in the first stage and positive in the second stage due to the boosting effect, is more sensitive, but causes discomfort to patients because repeated visits are needed to evaluate its performance. Most importantly, identifiable risk factors that because immunosuppression can overwhelm host defenses, ultimately weakening the innate immune response and type IV delayed susceptibility to PPD. Therefore, the sensitivity of the tuberculin test decreases in these people. A typical lack of response in this population group can have more negative results, which can be interpreted as the absence of LTBI or lack of response [72].

There is no specific technique for distinguishing between these two results. On the other hand, compared to TST, IGRA has a higher positive response rate and higher sensitivity among immunocompromised patients. However, in patients with severe immunodeficiency there is a higher rate of indeterminate results due to non-reactivity when using IGRA and it is more expensive compared to TST. In examining the lack of skin reaction to mycobacterium-derived protein (PPD), the results show that if a one-step tuberculin test is used with a cut-off limit equal to or greater than 10 mm, all people with latent tuberculosis may not be diagnosed, and with using the IGRA test, more of these people are identified [73].

Discussion

Reflux or GERD

The return of stomach acid into the esophagus is called reflux or gastroesophageal reflux (GERD); If the stomach is not emptied properly, its acidic contents can be pushed back into the esophagus and cause symptoms such as heartburn and mouth bitterness. High blood sugar with damage to the stomach nerves can eventually lead to reflux. In addition to lifestyle modification - weight loss, following a diet, not smoking, etc. - drug treatment and in rare cases surgery help to treat reflux.

Gastroparesis or stomach paralysis

One of the main nerves called the vagus nerve sends messages to the muscles of the stomach to force its contents to empty into the intestine; If this nerve is damaged during diabetes, gastric emptying becomes difficult and food enters the intestine later. This condition is called "Gastroparesis" or stomach paralysis or delayed gastric emptying, which is one of the effects of diabetes on the digestive system. Gastroparesis is more common in women and type 1 diabetes patients (Figure 3).

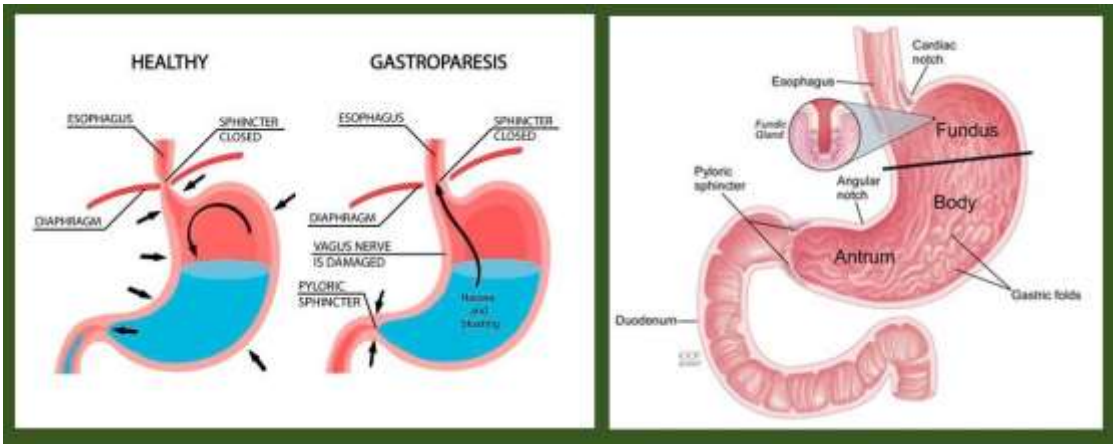

Figure 3. Gastroparesis or stomach paralysis

Symptoms of gastroparesis include the following

- Feeling full after eating a little;
- Bloating or discomfort after eating;
- Upper stomach pain;
- Nausea or vomiting;
- Loss of appetite;
- Lack of blood sugar control.

It is said that the possibility of this complication is more common in people who have had diabetes for a long time. Many treatments are available to help with this condition; In the first step, changing the diet can greatly help to relieve the symptoms. It is better to have small meals with low fiber and fat; Otherwise, the doctor may start drug treatment for you. In very severe cases, surgery may be necessary [73].

Diabetic enteropathy

Enteropathy means bowel disease; This condition often presents with alternating diarrhea and constipation, which in some ways mimics the symptoms of irritable bowel syndrome (IBS). The possibility of contracting it increases in case of gastroparesis. Damage to the intestinal nerves makes the normal passage of food through the digestive system difficult. This issue can eventually lead to constipation and provide conditions for the growth of bacteria; As a result, the probability of diarrhea will continue to increase. However, the occurrence of constipation and diarrhea may be related to the side effects of some medications. In addition, you may continue to experience faecal incontinence; This is worse after eating. The doctor first rules out other causes such as thyroid problems and side effects of medications.

Non-alcoholic fatty liver

The accumulation of fat in the liver is called "Fatty liver"; Alcoholic fatty liver occurs in those who do not consume alcohol or consume little alcohol due to diabetes or obesity. In case of non-alcoholic fatty liver disease, it becomes difficult to control blood sugar. However, it often causes no symptoms (Figure 4 & 5). Currently, there is no specific

treatment for non-alcoholic fatty liver; The doctor may recommend that you control your blood sugar more; Also, if you are overweight, he may recommend that you lose your weight and bring it to the ideal amount [74].

Figure 4. Forest plot showed Patients with Diabetes and Lower Limb Bone Fractures Based on Pharmacology

Figure 5. Forest plot showed Patients with Chronic Heart Pain and Lower Limb Bone Fractures Based on Radiology Points

Other complications of diabetes on the digestive system

The following digestive disorders are more likely to occur in people with diabetes than others

- Hepatitis C (a type of liver infection) and cirrhosis (liver ulcer);
- Hemochromatosis (accumulation of iron that can cause liver damage.).

Conclusion

Diabetes affects many organs of the body and causes problems in their normal function. One of the important organs of the body that is significantly affected by this disease is the sexual organ, which can cause many problems for the patient. One of the most important factors affecting marital relationships is the decrease in libido in people with type 2 diabetes. Diabetic ketoacidosis is considered one of the serious and dangerous complications of diabetes, which if not treated, can put the patient into a coma. In some people, due to the lack of insulin in the body or the relative resistance of the cells to insulin, glucose is not provided to the cells of the body in sufficient quantity.

Therefore, cells have to use fats instead of glucose for cellular metabolism. This unusual cellular process leads to an increase in waste products called ketones in the blood. With the gradual increase of ketones, the blood becomes acidic, and with the decrease in the PH of the body, the damage to the internal organs accelerates. Although this complication is more common in people with type 1 diabetes who are not treated, it rarely occurs in type 2 diabetes due to the resistance of cells to insulin. Long-term complications of diabetes appear over time. The longer you have diabetes and you don't control your blood sugar level, the higher the risk of complications. Complications of diabetes can be very limiting and life threatening. A very important point is to have a healthy lifestyle and annual blood sugar checkup. Osteoporosis or osteoporosis is actually a disease in which the bone mass is low and its tissue becomes weak and subsequently very fragile. This disease is the most common metabolic bone disease.

Osteoporosis is very common in postmenopausal women and 30% of them suffer from fractures caused by this problem. Osteoporosis is a painless disease until a fracture occurs. This disease is usually diagnosed after a bone fracture, especially in the femur neck and lumbar vertebrae. Therefore, no pain does not mean no osteoporosis. Severe osteoporosis may be present even without pain with a fracture. Fractures in such conditions can occur even spontaneously or with mild trauma such as a simple fall. In addition to aging and menopause, other factors such as underlying diseases and medications can act as risk factors for developing osteoporosis.

Among these diseases that because secondary osteoporosis is diabetes (type 1 and 2), hyperthyroidism, hyperparathyroidism, pregnancy, smoking and alcohol consumption, malnutrition, chronic liver and kidney disease, vitamin D deficiency, and AIDS, hemophilia and joint rheumatism and... Diabetes is a common disease with a clear link between type 1 and osteoporosis. Most research shows that bone health is compromised when diabetes occurs. The key answer to this connection is the interaction between bone and insulin. People with type 1 diabetes are more likely to develop osteoporosis. It seems that this decrease in bone density is due to the lack of insulin levels in these patients. Insulin increases bone density and can increase the absorption of amino acids and collagen production by affecting bone cells.

Research shows that type 2 diabetes directly affects bone metabolism and density. On the other hand, due to the lack of physical and sports activities, they suffer from this decrease in bone density and osteoporosis. Of course, some hypoglycemic drugs also lead to osteoporosis. Of course, on the other hand, the occurrence of diabetes complications with an increase in the probability of falling also leads to an increase in the risk of bone fractures. Due to the reduction of bone density in these patients, the probability of bone fractures is higher in these patients, and at the same time, in the event of a fracture, bone tissue repair is often delayed. The mortality rate due to fracture has been reported as high as 20%. Country, place of residence, race, age 40-90, sex, weight, family history, history of previous failures, smoking, joint rheumatism, use of glucocorticoid drugs, alcohol use and secondary osteoporosis following type 1 diabetes, malnutrition, chronic disease liver, hyperparathyroidism, etc. are among the factors that increase the probability of fracture following osteoporosis.

References

[1]. H Shahoon, SM Sajedi, Comparison of Efficacy of the BMP-2 Along with Nanosilver and Nanotitanium on Ectopic calcification of the Rectus Abdominis Muscle of Rats,The orginal Article, Journal of pharmaceutical Negative Results,2022,13(9),4368-4376.

[2]. E Babadi oregani,A Jafari, SM Sajedi,et al, Preventive Effect professional fluride supplements on Enamel Demineralization in patients undergoing fixed orthodontic treatment: A Systematic Reviw and Meta-Analysis, Turkish Journal of ORTHODONTICS, 2022,35(3),223-230.

[3]. H Shahoon, SM Sajedi,Anatomic Variations And Details of posterior Mandibular Region And inferior Mndibular canal: In Relation to implant placement, The orginal Article, Journal of pharmaceutical Negative Results,2022,13(9),4360-4367.

[4]. SM Sajedi, F Abbasi, M Asnaashar et.al, Comparative Efficacy of low-level laser Acupuncture and cupping for Treatment of patients with myofascial pain Dysfunction syndrome:A double-blinded,Randomized clinical trial, the orginal Article, Galen Medical Journal,2022,11(2022) .

[5]. SAH Moussavi jahanabadi et.al, Examining the principle of oral and dental Hygiene in children and the Elderly with Burn and Facial plastics surgery: the orginal Article,Tob Regul sci,2022,8(1),3198-3212.

[6]. Maryam Milani Fard, Atefeh Norouzi, Sara Shirzad, Elahe Horri, Farzad Esfandiary, Amir Mohammad Milani Fard, Behnam Mahmoodiyeh, A Brief Study of a Comprehensive Meta-Analysis Study of the Birth Outcomes of Corona Mothers in Iran, Journal of Chemical Reviews,2019,3(3), 181-195.

[7]. Amir Mohammad Milani Fard, Maryam Milani Fard, The Main Determinant of Muscle Strength and Endurance with Endurance Training and Effectiveness,orginal Article, International Journal of Advanced Studies in Humanities and Social Science,2019 , 11(2), 72-80.

[8]. Maryam Milanifard, Mohammad Akbari, Tahmine Mokhtari, Valiollah Hassani, Gholamreza Hassanzadeh, Predictive value of maxillopharyngeal angle to other multivariate airway assessment tests for difficult intubation in patients undergoing general anesthesia in Iranian population, the orginal Article, journal of medical science,2019,23(97),302-307.

[9]. Alireza Susanabadi, Behnam Mahmoodiyeh, Houshang Taleby, Soheil Etemadi, Mohammad Saleh Sadri, Maryam Milani Fard: A Systematic Short Review in Evaluate the Complications and Outcomes of Acute Severe of Pediatric Anesthesia, Journal of Chemical Reviews,2021,3(3), 219-231.

[10]. M Milanifard, Laboratory Findings of Bacterial Meningitis in Children: the orginal Article,Journal of GMJ Medicine,2021,5(1), 395-402 .

[11]. M Milanifard, Effects of Micronutrients in Improving Fatigue, Weakness and Irritability: the orginal Article,Journal of GMJ Medicine,2021,5(1), 391-395 .

[12]. F Mirakhori, M Moafi, M Milanifard, A Asadi rizi, H Tahernia et al, Diagnosis and Treatment Methods in Alzheimer's Patients Based on Modern Techniques: The Orginal Article, Journal of Pharmaceutical Negative Results,2022, 13(1), 1889-1907.
[13]. H Tahernia, F Esnaasharieh, H Amani, M Milanifard, F Mirakhori et al, Diagnosis and Treatment of MS in Patients Suffering from Various Degrees of the Disease with a Clinical Approach: The Orginal Article, Journal of Pharmaceutical Negative Results,2022,13(1), 1908-1921.
[14]. HD Soltani, M Jahanbin, S khorshidi et al, Evaluation of Alveolar crest Bone Resorption Around contilever Based Implants and Its comparison with single Tooth Restorative Implants, The orginal Article, Tobaccco Regulatory science(TRS),2022,8(1),2385-2401.
[15]. Fereshteh Baghaei, Alireza Abdollahi, Hadiseh Mohammadpour, Mahsa Jahanbin et.al, PTEN and miR-26b: Promising prognostic biomarkers in initiation and progression of Oral Squamous Cell Carcinoma, The Orginal Article,Journal of oral pathology& medicine,2019,48(1),31-35.
[16]. F Afkar, S Golalipour, M Akanchi, SM Sajedi, A Zandi Qashghaie, Systematic Reviews of Different Types of Drug Delivery in the Treatment and Prevention of Oral and Dental and Cardiorespiratory Diseases in Patients and Animals Involved, NeuroQuantology, 2022, 20 (8), 632-642.
[17]. N Samiei, H kaseb ghane, R fekrazad, Diode Laser Surgery as a Conservative Management of Hairy Tongue Lesion Resistance to Treatment: a case report study, Hindawi Case Report in Dentistry, 2021, 21(3), 1-5.
[18]. AAR Ghahroudi, AR Rokn, AR Shamshiri, N Samiei, Does timing of implant placement affect esthetic results in single-tooth implants? A cohort evaluation based on Mpes, Journal of Esthetic and Restorative Dentistry, 32(7), 2020, 715-725 .
[19]. Z Khezerlou, D Shojaei, S Jafari, A Arabkhazaie, SHA Abadi, The Principles of Care of the Treatment Staff for the Elderly with Fracture Problems and Corona Virus in the Special Care Unit, Tobacco Regulatory Science (TRS), 2022, 2825-2838.
[20]. S Sheikh, F Hatami, D Shojaei, A Shams, R Sourani, The Principles Of Treatment Staff Care Of Elderly Patients Under Burn & Plastic Surgery And With Covid-19 In ICU & Operating Room Based On Clinical Points: The Original Article, Journal of Pharmaceutical Negative Results, 2022 1967-1983.
[21]. M Taebi, SA Kalali Sani, Bita Fazeli, Daryanaz Shojaei, Nikoo Behdadian, The Principle of treatment staff care of children and Elderly Patients with covid-19 ,fracture and Multiple Trauma in ICU, The orginal Article, Tobacco Regulatory Science (TRS), 2022,8(1), 2825-2838.
[22]. S Hariri, S Golalipour, et al., Examining the Fracture Strength of Implant-based Fixed Partial Prostheses with Different Dimensions of Connectors in the System CAM/CAD/Zir, Tobacco Regulatory Science (TRS), 2022, 2310-2329.
[23]. S Golalipour, et al., Examination of Dental Problems and Radiological and Cardiac Evaluations in Patients Affected by Covid-19, NeuroQuantology, 2022, 20 (8), 1519- 1527.
[24]. N Shahkarami, M Nazari, M Milanifard, R Tavakolimoghadam, A Bahmani, The assessment of iron deficiency biomarkers in both anemic and non-anemic dialysis patients: A systematic review and meta-analysis, Eurasian Chemical Communications 4 (6), 463-472.
[25]. MR Moghadam, A Shams, ZS Moosavifard, F Shahnazari, D Shojaei, Principles of Health Care for Patients Involved in Fracture, Multiple Trauma and Type of Burns in Operating Room & Intensive Care Unit: The Original Article, Tobacco Regulatory Science (TRS), 2022, 2839-2854.
[26]. MM Fard, Effects of Micronutrients in Improving Fatigue, Weakness and Irritability, GMJ Med. 2021, 5 (1): 391 395.
[27]. M Yavari, SE Hassanpour, HA Otaghvar, HA Abdolrazaghi, AR Farhoud, The incidence of ossified superior transverse scapular ligament during nerve transfer through posterior shoulder approach, Archives of Bone and Joint Surgery, 2019, 7 (3), 258.
[28]. M Tarahomi, H Alizadeh Otaghvar, D Shojaei, F Goravanchi, A Molaei, Primary hydatid cyst of umbilicus, mimicking an umbilical hernia, Case Reports in Surgery 2016.
[29]. M Milanifard, G Hassanzadeha, Anthropometric study of nasal index in Hausa ethnic population of northwestern Nigeria, J Contemp Med Sci, 2018, 4 (1), 26-29.
[30]. I Seifi, D Shojaei, SJ Barbin, A Bahmani, Z Seraj, Methods of Diagnosis and Treatment of MS Disease Based on a Clinical Trial: The Original Article, Tobacco Regulatory Science (TRS),2022, 2351-2384.
[31]. HA Otaghvar, R Rezapour-Nasrabad, MA Ebrahimzadeh, M Yaghoubi, et al., The effects of Feijoa sellowiana fruit extract on wound healing in rats: a stereological and molecular study, Journal of Wound Care, 2022, 31 (Sup8), S36-S44.
[32]. H Mirjalili, H Amani, A Ismaili, MM Fard, A Abdolrazaghnejad, Evaluation of Drug Therapy in Non-Communicable Diseases; a Review Study, Journal of Medicinal and Chemical Sciences, 2022, 5 (2), 204-214 .
[33]. H Jahandideh, A Yarahmadi, S Rajaieh, AO Shirazi, M Milanifard, et al., Cone-beam computed tomography guidance in functional endoscopic sinus surgery: a retrospective cohort study, J Pharm Ree Int, 2020, 31 (6), 1-7 .
[34]. H Daneste; A Sadeghzadeh; M Mokhtari; H Mohammadkhani; F Lavaee; J Moayedi; Immunoexpression of p53 mutant-type in Iranian patients with primary and recurrence oral squamous cell carcinoma. European Journal of Translational Myology, 2022 .
[35]. H Alizadeh Otaghvar, K Afsordeh, M Hosseini, N Mazhari, M Dousti, Causes of wound dehiscence in trauma patients with penetrating and non-penetrating abdominal wound in Rasool Akram Hospital within 2017-2020, Journal of Surgery and Trauma, 2020, 8 (4), 156-160 .
[36]. H Alizadeh Otaghvar, S Moghaddam, A Molaei, et al., Pharmacological and Medical Effect of Modified Skin Grafting Method in Patients with Chronic and Severe Neck Burns, Journal of Medicinal and Chemical Sciences, 2021, 369-375.

[37]. F Mirakhori, M Moafi, M Milanifard, A Asadi rizi, H Tahernia, Diagnosis and Treatment Methods in Alzheimer's Patients Based on Modern Techniques: The Orginal Article, Journal of Pharmaceutical Negative Results, 2022, 13 (1), 1889-1907 .
[38]. F Afkar, S Golalipour, M Akanchi, SM Sajedi, A Zandi Qashghaie, Systematic Reviews of Different Types of Drug Delivery in the Treatment and Prevention of Oral and Dental and Cardiorespiratory Diseases in Patients and Animals Involved, NeuroQuantology, 2022, 20 (8), 632-642.
[39]. H Danesh, A Bahmani, F Moradi, B Shirazipour, M Milani Fard, Pharmacological Evaluation of Covid 19 Vaccine in Acute and Chronic Inflammatory Neuropathies, Journal of Medicinal and Chemical Sciences, 5(4), 2022, 561-570 .
[40]. B Mahmoodiyeh, S Etemadi, A Kamali, S Rajabi, M Milanifard, Evaluating the Effect of Different Types of Anesthesia on Intraoperative Blood Glucose Levels in Diabetics and Non-Diabetics Patients: A Systematic Review and Meta-Analysis, Annals of the Romanian Society for Cell Biology, 2021, 2559–2572 .
[41]. A Molaei, H Alizadeh Otaghvar, M Tarahomi, D Shojaei, L Mohajerzadeh, M Baghoori, F Niazi, A bizarre presentation of Peutz–jegher's syndrome in a 2 year old, Iranian Journal of Pediatric Surgery, 2017, 3 (2), 104-106.
[42]. A Molaei, HA Otaghvar, M Tarahomi, D Shojaei, L Mohajerzadeh, et al., A bizarre presentation of Peutz–jegher's syndrome in a 2 year old, Iranian Journal of Pediatric Surgery 3 (2), 2017, 104-106.
[43]. N Zaimzadeh, et al., The study of dietary intake of micronutrients in four phenotypes of polycystic ovary syndrome separately based on Rotterdam criteria, Razi Journal of Medical Sciences, 2018, 25 (3), 59-68.
[44]. P Dini, B Shakiba, R Alimoradzadeh, N Torabi, MWC Watch, Impaired mental health status and uncivil workplace behavior's: An egg and chicken problem, Journal of affective disorders, 2021, 281, 502.
[45]. P Serrano, et al., Nuclear magnetic resonance structure of the nucleic acid-binding domain of severe acute respiratory syndrome coronavirus nonstructural protein 3. J Virol, 2009. 83(24): p. 12998-3008.
[46]. R Alimoradzadeh, et al., Effect of Anesthetics on Oxidant and Antioxidant Parameters After Inguinal Hernia Surgery in Older Patients, Iranian Journal of Ageing, 2021, 15(4), 524-533.
[47]. R Alimoradzadeh, et al., Effect of Memantine on Oxidative and Antioxidant Indexes Among Elderly Patients with Prediabetes and Mild Cognitive Impairment, Journal of Neurology & Neurophysiology, 2019, 10 (1), 1-5.
[48]. R Alimoradzadeh, et al., Investigation of the Chemistry of Metformin by Targeting the Nrf2 Signaling Pathway (A response Surface Methodology Approach), Chemical Methodologies, 2022, 6 (3), 166-173.
[49]. R Alimoradzadeh, M Mokhtare, S Agah, Comparing the prevalence of constipation risk factors in the elderly with and without constipation in Hazrat-e Rasoul (PBUH) Hospital, Iranian Journal of Ageing, 2017, 12(1), 78-89.
[50]. RL Graham, et al., The nsp2 replicas' proteins of murine hepatitis virus and severe acute respiratory syndrome coronavirus are dispensable for viral replication. J Virol, 2005. 79(21): p. 13399-411.
[51]. RN Kirchdoerfer, et al., Structure of the SARS-CoV nsp12 polymerase bound to nsp7 and nsp8 co-factors. Nat Common, 2019. 10(1): p. 2342.
[52]. Rothan HA, Byrareddy SN. The epidemiology and pathogenesis of coronavirus disease (COVID-19) outbreak. Journal of autoimmunity. 2020:102433.
[53]. S Azizi Aram, S Bashar poor, The role of rumination, emotion regulation and responsiveness to stress in predicting of Corona anxiety (COVID-19) among nurses. Quarterly J of Nursing Management 2020; 9 (3): 8-18.
[54]. S Golalipour, et al., Examination of Dental Problems and Radiological and Cardiac Evaluations in Patients Affected by Covid-19, NeuroQuantology, 2022, 20 (8), 1519- 1527.
[55]. S Mahmoodi, et al., General health and related factors in employed nurses in Medical-Educational Centers in Rasht. JHNM 2015; 25 (1): 63-72.
[56]. S Musaei, The Effect of Pregnancy on the Skin, Eurasian Journal of Chemical, Medicinal and Petroleum Research, 2023, 2 (1), 17-23.
[57]. S.H Salehi, K As'adi, S.J Mousavi, S Shoar, Evaluation of Amniotic Membrane Effectiveness in Skin Graft Donor Site Dressing in Burn Patients, Indian J Surg, 2015 Dec;77(Suppl 2):427-31.
[58]. S.H Salehi, M.J Fatemih, K Aśadi, S Shoar, A Der Ghazarian, R Samimi, Electrical injury in construction workers: a special focus on injury with electrical power, Burns, 2014 Mar;40(2):300-4.
[59]. Samiei, N. Ghane, HK. Khaled, Y. COVID-19 and Periodontal Disease: The Potential Role of Interluekin-6, SVOA Dentistry, 2021, 2(6), 254-257.
[60]. SE Ahmadi, M Farzanehpour, AMM Fard, MM Fard, HEG Ghaleh, Succinct review on biological and clinical aspects of Coronavirus disease 2019 (COVID-19), Romanian Journal of Military Medicine, 2022, 356-365.
[61]. SP. Smieszek, Przychodzen BP, Polymeropoulos MH. Amantadine disrupts lysosomal gene expression; a hypothesis for COVID19 treatment. International Journal of Antimicrobial Agents. 2020:106004.
[62]. Stoessl AJ, Bhatia KP, Merello M. Movement Disorders in the World of COVID-19. Movement Disorders Clinical Practice. 2020;7(4):355-6.
[63]. SZ Nazardani, et al., A comprehensive evaluation of the Sports Physiotherapy curriculum. Eurasian Journal of Chemical, Medicinal and Petroleum Research, 2(1), 2023, 10-16.
[64]. TSH Abadi, et al., Depression, stress and anxiety of nurses in COVID-19 pandemic in Nohe-Dey Hospital in Torbat-e-Heydariyeh city, Iran. J of Military Med 2020; 22 (6): 526-33.
[65]. V. Monteil, Dyczynski M, Lauschke VM, Kwon H, Wirnsberger G, Youhanna S, et al. Human soluble ACE2 improves the effect of remdesivir in SARS-CoV-2 infection. EMBO molecular medicine. 2020: e13426.
[66]. XU Hao, High expression of ACE2 receptor of 2019-nCoV on the epithelial cells of oral mucosa. International Journal of Oral Science (2020) 12:8; https://doi.org/10.1038/s41368-020-0074-x.

[67]. Y Furuta, et al., Favipiravir (T-705), a novel viral RNA polymerase inhibitor. Antiviral research. 2013;100(2):446-54.
[68]. Y Raziani, S Raziani, Evaluation of Mental Health of Chemotherapy-Treated Cancer Nurses, Journal of Medicinal and Chemical Sciences, 2021, 4(4), 351-363.
[69]. Y Raziani, S Raziani, The effect of air pollution on myocardial infarction, Journal of Chemical Reviews, 2021, 3(1), 83-96.
[70]. YA Helmy, et al., The COVID-19 pandemic: a comprehensive review of taxonomy, genetics, epidemiology, diagnosis, treatment, and control. Journal of Clinical Medicine. 2020;9(4):1225.
[71]. DH Birman, Investigation of the Effects of Covid-19 on Different Organs of the Body, Eurasian Journal of Chemical, Medicinal and Petroleum Research, 2023, 2(1), 24-36.
[72]. S Musaei, The Effect of Pregnancy on the Skin, Eurasian Journal of Chemical, Medicinal and Petroleum Research, 2023 2(1), 17-23.