Systematic Investigation of the Occurrence of Dental Problems, Cardiopulmonary Injuries and Duration of Hospitalization in ICU in Patients Affected by Covid-19 and Intubation in them

Hemin Ashayeri[1], Roghayeh Mohseni[2], Zahra Khazaie[3], Shaghayegh Golalipour[4], Zahra Attaran Bondarabadi[5*]

[1]Faculty of Medicine, Tehran Medical Sciences Branch, Islamic Azad university, Tehran, Iran
Email: Hemin.Ashayeri@gmail.com

[2]Senior Graduate of medical Education, Shiraz university of medical sciences, Department of Youth Health, vice President of the university, shiraz, Iran
Email: ro.mohseni63@gmail.com

[3]Department of Anesthesia, Faculty of para-medicine, Hormozgan university of medical sciences, Bandar Abbas, Iran
Email: yasamankhazaie94@gmail.com

[4]Dentist, Resident of Dental Prostheses, Azad University of Medical Sciences, Tehran, Iran
Email: sh.golalipour@gmail.com

[5]General Dentist, school of Dentistry, Shahed University, Tehran, Iran
Email: zahattaran@gmail.com

*Corresponding Author: Zahra Attaran Bondarabadi
*Corresponding Author Email: zahattaran@gmail.com

Abstract

This study has systematically investigated the occurrence of dental problems, cardiopulmonary injuries and the duration of hospitalization in ICU in patients affected by Covid-19 and intubation in them. In this study, 121 articles were reviewed, considering dental problems, cardiopulmonary injuries and duration of hospitalization in ICU. Mouth and teeth or gum problems are very common and almost everyone has experienced these types of problems at least once in their life. Most people do not take oral problems seriously, and the same thing can become serious over time, so that the tooth infection is transmitted to the body, and therefore the health of the mouth and teeth is as important as the health of other parts of the body. Tooth infection is not a sudden and overnight phenomenon; Rather, it shows time to the marble. In most cases, fracture or decay provides the conditions for bacteria to penetrate into the internal parts and cause an infection. Tooth extraction due to trauma, tooth extraction, nerve extraction, failed surgery, wisdom tooth, or neglect of hygiene are other causes of this infection. Toothache is one of the symptoms of infection. The pain can extend to other parts of the face such as ears, jaws and cheeks. Toothache worsens during sleep. Other symptoms of tooth infection include the high sensitivity of the affected tooth to chewing food, hot and cold drinks. Sometimes a person experiences a bad

smell or taste in his mouth. If the tooth infection worsens, it causes swelling of the cheek, neck, tonsils, and even lymph nodes. Tooth infection is one of the most common oral and dental problems, which is accompanied by pain, sensitivity to pressure, redness, bad smell and taste. This infection, like other infections, has the ability to spread and spread to the tissues, bones, skin and internal organs of the body. For this reason, the lack of timely treatment leaves serious complications, among which we can mention cardiovascular, kidney, brain, respiratory, bone marrow inflammation, and skin inflammation. Therefore, it is necessary to pay attention to the signs of spreading dental infection in the body to prevent serious problems.
Key words: Dental Problems, Heart Injuries, Lung, ICU.

Tob Regul Sci. ™ 2022;8(1): 2124-2146
DOI: doi.org/10.18001/TRS.8.1.161

Introduction

Maintaining oral and dental hygiene increases the life of teeth and prevents them from decaying. Tooth decay is one of the most common diseases that people get over time. In addition to being accompanied by pain, this problem also destroys the beautiful appearance of the teeth [1-3].

On the other hand, tooth decay or gum infection often cause problems in the heart and blood vessels. Since the heart is a very sensitive organ, tooth decay in the early stages consists of several small surface spots that gradually grow and become deeper [4-6] Usually, people who don't brush their teeth properly and sufficiently, see their teeth decay, and unfortunately, many of them are negligent about the treatment of tooth decay [7-9]. The fact is that treating caries in the early stages saves more teeth and pays less [10-12]. The pulp chamber is the soft tissue of the tooth that contains a large number of blood vessels and nerves [13]. It is obvious that the presence of infection in this part brings other complications besides pain. One of the complications of dental infections is the development or exacerbation of heart diseases. Below you can see a number of cardiovascular diseases that are somehow related to tooth decay [14-16].

"We are now investigating some of the confusing and sometimes debilitating symptoms that patients suffer months after recovering from the coronavirus," said Dr. William W. Lee, president and medical director of the angiogenesis foundation, including these reports to dental problems and loss of teeth [17-19]. The angiogenesis foundation is a non-profit organization that studies blood vessel health and disease [20-22]. The new corona virus wreaks havoc by binding to the ACE2 protein that is present in the entire human body. Viro is found not only in the lungs, but also in nerve and endothelial cells. So, Dr. Lee says the virus may have damaged the blood vessels that keep teeth alive in Covid-19 survivors. It may also be the reason why people who have lost their teeth have no pain [23-25]. "If there's a long-term corona reaction in the mouth, it's a defense mechanism against the virus," said Dr. Michael Scherer, an orthodontist in Sonora, California. He said: "Other inflammatory health diseases, such as cardiovascular diseases and diabetes, are related to gum disease [26-28]. Dr. Sherer said: "Gum disease is very sensitive to excessive inflammatory

reactions, and long-acting corona blockers are also in this group [29]. "Dentists have not seen many cases like this and some reject these individual claims. But doctors like Dr. Lee say that the wonders of Corona require that the medical staff also be careful about the unexpected consequences of the disease [30]. He said: "Patients may give us new findings" and doctors and dentists should cooperate in understanding the long-term effect of corona on teeth. While most people with Covid-19 recover and return to normal health, some patients can have symptoms that may persist for weeks or even months after recovery [31-33]. Even people who are not hospitalized and have a mild illness can experience persistent or late symptoms. Now the question is, what are the long-term effects of Covid-19 after recovery?

Evidence in the context of answering the question

The elderly and many with underlying medical conditions are more likely to experience long-term symptoms of Covid-19, but even young people can feel unwell for weeks to months after infection. Common signs and symptoms that persist over time include fatigue, shortness of breath, coughing, joint pain, chest pain (Figure 1) [34].

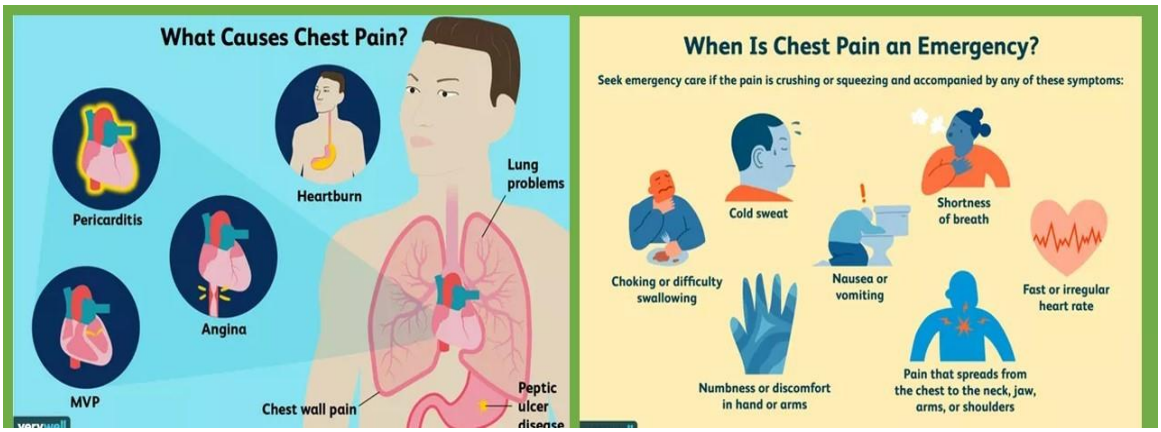


Figure 1. What Is Causing the Pain in Your Chest?

Other long-term symptoms and signs may include: muscle pain or headache, fast or rapid heartbeat, loss of smell or taste, memory problems, difficulty concentrating or sleeping, rashes and hair loss [35].

Damage to body organs caused by Covid-19: Although Covid-19 is a disease that primarily affects the lungs, it can also damage other organs. Damage to organs may increase the risk of long-term health problems [36].

Research Methods

In this research, 121 studies have been reviewed. All subjects under study were treated in special care units of the hospital [37]. The evidence in this Cochrane review is up to date as of February 2020. The ICU and special care units treat patients with severe or life-threatening illnesses and injuries that require continuous care, close monitoring using supportive equipment and medication to ensure normal body function [38].

Discussion and Review

Many people do not know about the signs and symptoms of cardiopulmonary disease and may endanger their health and those around them due to their ignorance [39]. For example, diabetes is one of the risk factors for cardiovascular diseases, and people with diabetes should be more concerned about their cardiovascular health than other healthy people. These people should be under the close care and supervision of a doctor so that if the disease worsens, the doctor will diagnose the cause of the disease in a short period of time and recommend medicine or treatment steps to treat the person [40-42].

Search strategy and selection of articles

Search in Scopus, Google scholar, PubMed databases and by searching with keywords such as " Occurrence of Dental Problems" and "Cardiopulmonary Injuries and Duration of Hospitalization" and "Intubation" to obtain articles related to the selected keywords [43-45]. 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 2).

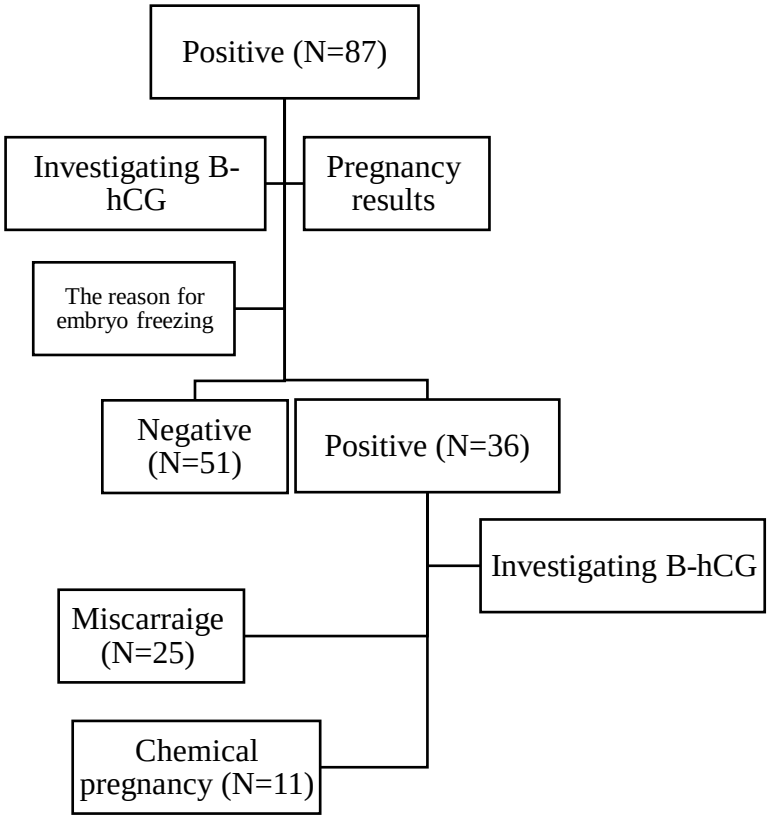


Figure 2. Flow chart of included subjects

Organs that may be affected include

Heart: Imaging tests done months after recovering from Covid-19 have shown permanent damage to the heart muscle. Even in people who have experienced only mild symptoms of Covid-19, the risk of heart failure or other heart complications may increase in the future [46-48].

Lungs: The type of pneumonia often associated with Covid-19 can cause long-term damage to the tiny air sacs (alveoli) in the lungs. The resulting tissue damage can lead to long-term breathing problems [49].

Brain: Even in young people, Covid-19 can cause strokes, seizures and Guillain-Barré syndrome (temporary paralysis). Covid-19 may also increase the risk of Parkinson's disease and Alzheimer's disease [50].

Blood clots and blood vessel problems: Covid-19 can make blood cells more likely to clot and cause heart and brain attacks, but it is believed that most of the heart damage caused by Covid-19 is from very small clots. It occurs when the small blood vessels (capillaries) in the heart muscle become blocked [51-53]. Other parts of the body that are affected by blood clots include the lungs, legs, liver, and kidneys. Covid-19 can also weaken blood vessels and cause them to leak, leading to possible long-term liver and kidney problems [54].

Problems with mood and fatigue: People with severe symptoms of Covid-19 often have to be placed in the intensive care unit of a hospital on mechanical treatment such as ventilators to breathe [7]. Surviving and recovering from this experience causes the person to suffer from post-traumatic stress syndrome, depression and anxiety. Because it is difficult to predict the long-term consequences of the new Covid-19 virus, scientists have looked at the long-term effects in related viruses such as the SARS virus. Many people who have recovered from SARS develop chronic fatigue syndrome, a complex disorder that worsens with physical or mental activity and does not improve with rest. The same may be true for people who have had Covid-19 [55].
However, many of the long-term effects of Covid-19 and their significance are still unknown. The US Center for Infectious Disease Control continues its research in this field and, as new data emerges, it updates the way of clinical care for Covid-19 as well as the public health response to this disease.

Acute coronary syndrome disease

When decay reaches the pulp chamber of the tooth, it causes an infection, and then the bacteria find their way to the root of the tooth. We said that the pulp chamber contains a large number of blood vessels and nerve fibers that become inflamed due to infection. Since the body fights infection to defend itself, severe inflammation is observed in the root of the tooth. If the infection and inflammation in the pulp chamber is severe, bacteria and infectious agents may be directed to

the heart and surrounding vessels through the blood vessels. Acute coronary syndrome is one of the diseases that can be caused by tooth decay and infection [56].

Blood pressure disease and narrowing of heart arteries

If the bacteria and germs in the root of the tooth enter the heart and surrounding vessels through the blood vessels, they destroy the walls of the heart arteries. In a short period of time, this damage causes blockage of heart vessels and stroke. Also, the bacteria causing decay are transferred to the whole body through the veins and destroy the vessel wall (Figure 3). This issue has caused an increase in blood pressure, and as you know, blood pressure is considered a serious threat to the heart [57].

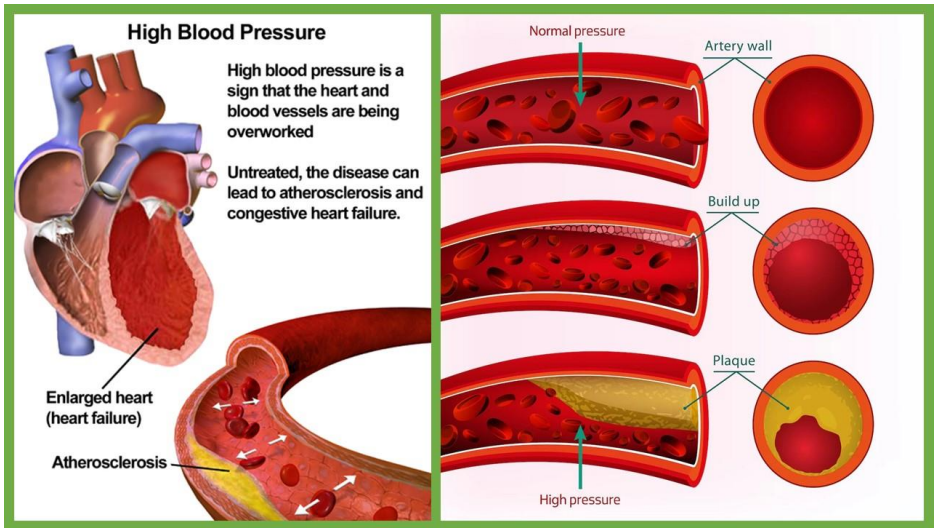


Figure 3. Blood pressure disease

Endocarditis

Bacteria and microbial agents that are present in tooth decay, if they reach the pulp chamber, they go to the heart through blood vessels and can cause a dangerous endocarditis disease there. Endocarditis is a bacterial disease in which the entire inner surface of the heart is covered with infection. This disease causes death if not treated quickly [57].

Is toothache related to heart attack?

In many cases when a heart attack occurs, before the stroke, a person feels a severe pain in his lower jaw, which is similar to a toothache. Note that this has nothing to do with tooth decay and is only a sign of stroke in some cases. It can be said that lower jaw pain without dental cause is one of the important symptoms of heart attack. Research and statistics have proven that the higher the level of oral and dental hygiene, the lower the incidence of heart diseases.

Obesity

If the number of teeth is less than 21, it means that the food is not chewed well and in this way the process of digestion and absorption does not take place properly. On the other hand, a person who does not have teeth is attracted to soft foods, which are usually fattier and unhealthier. For example, fast foods and sweet drinks are among the foods that cause obesity. Also, if a person has decayed teeth that become painful when biting and chewing food, similar things also happen and gradually cause excessive obesity. Obesity is one of the important factors for heart diseases.

Diabetes

Diabetes and tooth decay have an important relationship and sometimes they arise from each other. It is possible that tooth decay gradually causes infection in the root, and when the infection enters the blood, it has an important effect on blood sugar control, and if this situation continues, the possibility of diabetes increases. Also, diabetes can cause various gum and tooth diseases.

Dementia

Detailed research has not yet been done on the relationship between tooth decay and dementia diseases such as Alzheimer's, but statistics show that more than half of Alzheimer's patients have some kind of bacterial disease in the mouth and gums. Also, people suffering from dementia usually suffer from chronic tooth decay [9].

Respiratory Diseases

It is clear that the bacteria that cause tooth decay remain in the mouth until the treatment is done. In a person suffering from tooth decay, a large number of bacteria and microbes enter the lungs with each breath. In some cases, these bacteria may multiply in the lungs and cause rare respiratory diseases. People who have asthma or lung failure should try harder than others to maintain oral and dental hygiene.

Lung Infections

When a part of the lung tissue and airways bags become inflamed and mucus and secretions close the respiratory tract and a person has difficulty breathing, it is said that a lung infection has occurred. Lung infection may be caused by the presence of various organisms in the lung. These organisms can include a variety of viruses, parasites, or bacteria. Lung infection is a common disease that is very dangerous especially in young children and the elderly. The infection that occurs in the lung affects most of the air sacs that are present in the lung and affects the airways that transmit air to the lungs to a lesser extent. A part of the lung that has a severe infection is filled with fluid. This fluid contains white blood cells that are produced to fight infection. As mentioned, the prevalence of lung infection is very high and every year about one percent of adults are affected by this disease. Also, every year some of these people die.

Lung Infections

As mentioned, lung infection or pneumonia is caused by small organisms such as viruses, bacteria, fungi, etc. that lead to disease. These organisms usually do not exist in the lungs of healthy people, and sometimes these small organisms reach the lungs through the bloodstream and cause infection. But most of the time, the organisms are transferred to the lungs by the tiny water droplets in the breathing air or the respiratory droplets that are transferred from one person to another [10].

The source of these small organisms can be people who, due to their illness, spread their respiratory droplets to others by coughing and sneezing. Sometimes these microbes originate from uncommon places. For example, the organisms that cause a particular type of lung infection called Legionella pneumonia are organisms that live in warm water. Another example is psittacosis, which usually originates from private birds such as parrots. Also, staphylococci resistant to methicillin are usually found in hospitals and can cause lung infection or pneumonia in people admitted to the hospital for different reasons. In addition to the organisms that can cause lung infection, other factors such as inhalation of various chemicals such as toxic vapors may cause inflammation in people's lungs. In some rare cases, lung inflammation may be caused by inhaling allergenic substances. People who have special jobs may encounter substances that exist in the workplace or other types of environments while working, which causes inflammation in the lung tissue of these people. For example, we can mention some farmers who may suffer from lung inflammation when breathing dust from moldy grains. People who have special jobs may encounter substances that exist in the workplace or other types of environments while working, which causes inflammation in the lung tissue of these people. For example, some farmers may suffer from lung inflammation when they inhale the dust from moldy grains. People who have special jobs may be affected when working with materials that are in the workplace or types of there are other environments that cause inflammation in the lung tissue of these people (Figure 4). For example, we can mention some farmers who may suffer from lung inflammation when they breathe dust from moldy grains [11].

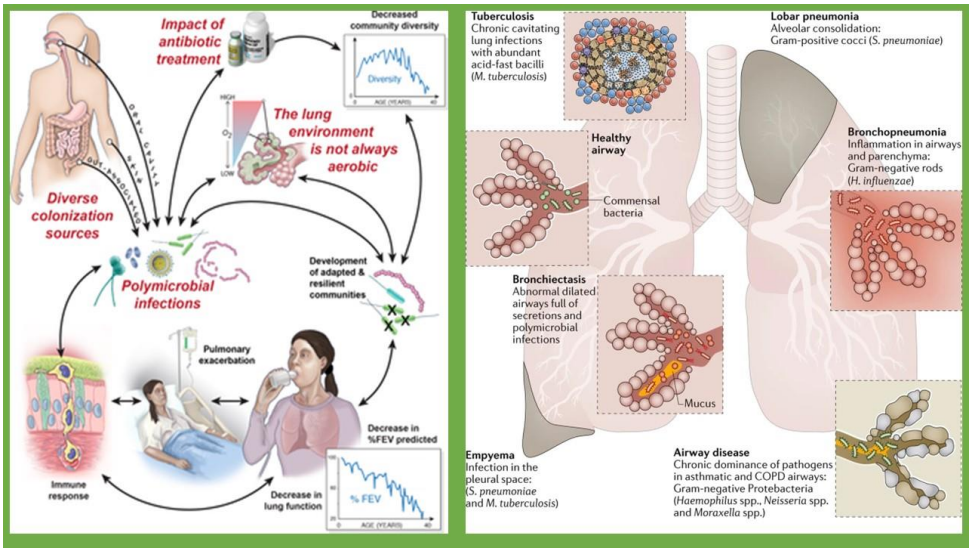


Figure 4. Lung Infections

Symptoms of lung infection

Symptoms of lung infection usually appear suddenly. Common symptoms of lung infection include:

- Shortness of breath;
- Chest pain;
- Cough, fever, and occasional chills are mentioned.
- Coughs are dry at first, but when one or two days have passed, they may be accompanied by yellow-green phlegm and blood vessels.

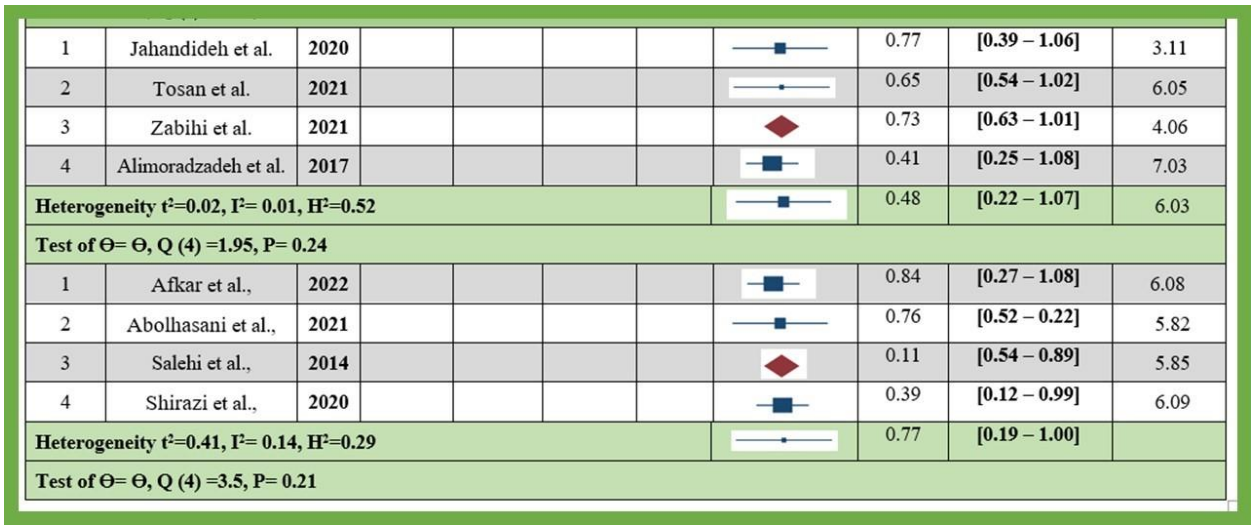
Symptoms of a lung infection can vary from mild to severe symptoms. The occurrence of symptoms and their severity depends on various factors, which can be the age of the person, the general health of his body, and whether the person's disease is caused by bacteria, viruses, or fungi. Symptoms may be as mild as those of the common cold and flu, but they tend to last longer in the body. The first thing that appears in a lung infection is a cough that creates a thick audience. Coughs help the body to get rid of mucus caused by inflammation of the airways and lungs. Also, sometimes these coughs may contain blood (Figure 5 & 6). When a person has bronchitis or pneumonia, he may have a cough that has thick mucus and its color may be between colors such as:

- Transparent;
- White;
- Green;
- And different grayish yellow;
- It should also be noted that even after the symptoms improve, coughs may remain in the body for several weeks.

The next thing is the feeling of sharp and burning pain in the chest. The pain that occurs in the chest during a lung infection is described as sharp or burning pains. Chest pain intensifies when a person coughs and takes deep breaths. Sometimes severe pains can be felt in the middle parts of the body and in the back of the person's back [12].

Raw	Study	Year	Proportion Wight 98%		Weight %
1	Golalipour et al.	2022	0.64	[0.11 – 1.72]	3.02
2	Monirifard al.	2019	0.52	[0.42 – 2.11]	4.00
3	Alimoradzadeh et al	2022	0.96	[0.44 – 1.02]	6.32
4	Abhari et al	2019	0.65	[0.25 – 0.98]	5.12
Heterogeneity t^2=0.00, I^2= 0.00, H^2=0.9			0.55	[0.34 – 0.58]	1.23
Test of Θ= Θ, Q (4) =3.45, P= 0.77					
1	Bagheri Sadr et al.	2022	0.56	[0.11 – 0.66]	1.55
2	Abolhasani et al.	2021	0.26	[0.15 – 0.48]	4.33
3	Milanifard et al.	2018	0.48	[0.19 – 0.55]	6.77
4	Mirjalili et al.	2022	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 Θ= Θ, Q (4) =3.01, P= 0.11					

Figure 5. Forest plot showed Occurrence of Dental Problems, Cardiopulmonary Injuries and Duration of Hospitalization in ICU



1	Jahandideh et al.	2020	0.77	[0.39 – 1.06]	3.11
2	Tosan et al.	2021	0.65	[0.54 – 1.02]	6.05
3	Zabihi et al.	2021	0.73	[0.63 – 1.01]	4.06
4	Alimoradzadeh et al.	2017	0.41	[0.25 – 1.08]	7.03
Heterogeneity t^2=0.02, I^2= 0.01, H^2=0.52			0.48	[0.22 – 1.07]	6.03
Test of Θ= Θ, Q (4) =1.95, P= 0.24					
1	Afkar et al.,	2022	0.84	[0.27 – 1.08]	6.08
2	Abolhasani et al.,	2021	0.76	[0.52 – 0.22]	5.82
3	Salehi et al.,	2014	0.11	[0.54 – 0.89]	5.85
4	Shirazi et al.,	2020	0.39	[0.12 – 0.99]	6.09
Heterogeneity t^2=0.41, I^2= 0.14, H^2=0.29			0.77	[0.19 – 1.00]	
Test of Θ= Θ, Q (4) =3.5, P= 0.21					

Figure 6. Forest plot showed Patients Affected by Covid-19 and Intubation

Fever is one of the next symptoms seen in lung infection and we will describe it here. When a person's body uses its immune system to fight an infection, a fever occurs [13]. The normal body temperature of people is usually around 37 degrees Celsius, if the person has bacterial infections in the lungs, it is possible that the temperature of the person's body can rise to about 40.5 degrees Celsius, which is a very dangerous level of high fever. The fever may rise again, so one must take measures to prevent the fever from rising. If a person's fever rises above 38.9 degrees Celsius, it often leads to symptoms such as:

- Chills;
- Sweating;
- Muscle pains;
- Headache;

- Weakness;
- And there is a lack of water in the body;
- Also, if a person's fever rises above 38.9 degrees Celsius or continues for more than three days, the person must see a doctor [14].

Body pain is also one of the other causes of symptoms that can be seen in a person's body during a lung infection. When suffering from a lung infection, a person's muscles and back may experience pain, which is also called myalgia. In some cases, inflammation may also occur in the muscles, which can lead to body pain in case of infection [15].

A runny nose is another symptom that is often associated with a lung infection similar to bronchitis and is accompanied by a series of flu symptoms such as sneezing. Shortness of breath and wheezing are also other symptoms. Shortness of breath in this case means that a person feels unable to breathe or has difficulty breathing in his lungs. If a person has difficulty in breathing, he should see a doctor immediately. Also, when exhaling and exhaling, a person's chest may make sounds like loud whistles that a person hears as wheezing, this state occurs when the airways are narrowed or inflamed. Usually, when facing an infection, the body feels lazy and tired. This is due to the fact that at this time the body is fighting the infection and causes fatigue in the body. Rest is one of the most important factors to improve in this situation. Bruising of skin color or lips may also occur due to lack of oxygen during lung infection. In this case, the person's lips or nails appear with a blue color. The sound of cracking or snoring in the lungs is also one of the symptoms that indicate the presence of a lung infection. These sounds originate from the ends of the lungs, which are also known as crackles or bibasilar crackles. A specialist doctor can hear these sounds and diagnose the disease by using tools such as stethoscopes or stethoscopes.

Causes of lung infection

There are different types of lung infection caused by viruses, bacteria and fungi.

- Bronchitis;
- Pneumonia;
- Bronchiolitis.

They are among the three most common types of lung infections. The most common microorganisms that because bronchitis are viruses such as influenza viruses or respiratory syncytial viruses.

Also, bacteria such as:

- Mycoplasma pneumonia;
- Chlamydia pneumonia;
- And Bordetlapertussis.

They are also among the microorganisms that cause bronchitis. Among the most common microorganisms that because pneumonia are bacteria such as Streptococcus pneumonia, which is

the most common microorganism that causes pneumonia, as well as Haemophilus influenza and Mycoplasma pneumonia bacteria, as well as viruses such as influenza virus or (RSV) [16].

Types of lung infections are rarely caused by fungi such as

- Pneumocystis jirovsi;
- Histoplasma capsulatum;
- Or aspergillus is created in the person's body.

Fungal lung infections occur more often in people whose immune systems are suppressed. This suppression occurs due to the occurrence of certain types of cancer, AIDS, or the use of drugs that suppress the immune system of the immune system in some people [17].

Tuberculosis Symptoms

It should be noted that tuberculosis is one of the infectious diseases of the lungs, which is caused by the bacterium Mycobacterium tuberculosis. This disease is spread by coughing. It is not possible to transmit this disease to other people through food, blood transfusion and insect bites.

The signs and symptoms of the disease can also be

- Shortness of breath;
- Fever;
- Cough;
- Green sputum or sputum contaminated with blood;
- Loss of appetite;
- Premature fatigue;
- Mentioned general weakness and lethargy and night sweats.

Symptoms of bronchitis

When inflammation and infection occur in the lining of the bronchial tubes of the lung and the immune system of the person is weakened, a lung infection occurs, which is called bronchitis.

Bronchitis can be acute or chronic. Among the symptoms of this type of lung infection are:

- Wheezing;
- Shortness of breath;
- Chest pain;
- Heavy mucus;
- Continuous coughing.

Sinusitis and lung infection

When a part of the lung or the airway sacs become inflamed and in them the phlegm and secretions such as the person's breathing are blocked, lung problems such as lung infection occur in the child.

This disease in children may occur after a severe cold that is not properly treated [18]. Some of the signs and symptoms of the disease in children are almost the same as in adults. Among the same symptoms as adults due to the presence of lung infection (Figure 7) in children, we can include:

- Chest pain;
- Fever;
- Cough;
- Lethargy;
- And noted anorexia;
- It is also possible for children to have shortness of breath;
- Rapid pulse;
- Bruising of the skin, especially around the mouth;
- Vomit;
- Diarrhea in infants;
- Restlessness and not feeding well;
- Abdominal distension and pain are among the symptoms in babies that can be mentioned.

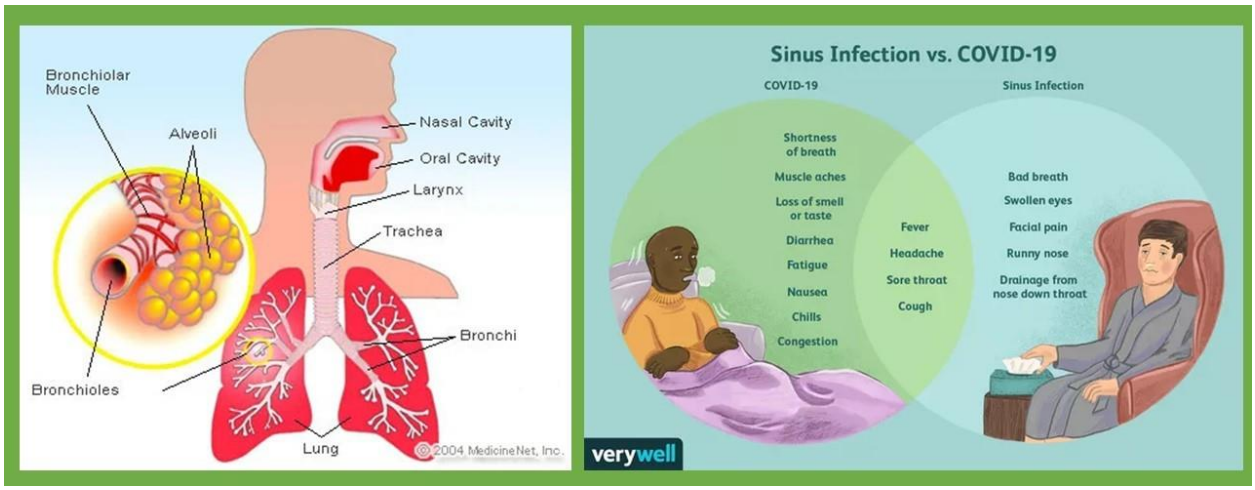


Figure 7. Sinusitis and lung infection

To treat a child's fever, you can:

- From the baby's face wash or correct body wash;
- Antipyretic drugs prescribed by the doctor;
- Drop;
- Syrup;
- Acetaminophen suppositories;
- And he used ibuprofen syrup.

You can also keep the air around the baby moist to make it easier for the baby to breathe. For this purpose, it is better to use warm and moist humidifiers on the upper part of the child's head. Humming helps to loosen the discharge and makes it easier for the child to empty it [19].

Pulmonary blood pressure

Pulmonary hypertension is a type of high blood pressure that affects the arteries in your lungs and the right side of your heart. In one type of pulmonary hypertension, the fine blood vessels in the lungs, also known as pulmonary arterioles and capillaries, become narrowed, blocked, or damaged. This makes it harder for blood to flow through your lungs and raises the blood pressure in your pulmonary arteries. As the pressure increases, the lower right chamber of your heart (right ventricle) must work harder to pump blood to the lungs. This often causes your heart muscles to weaken. Some types of pulmonary hypertension are a serious problem that is progressive and sometimes fatal. Although some types of pulmonary hypertension cannot be cured, treatment can help reduce symptoms and improve patients' quality of life [20].

When is shortness of breath a sign of heart disease?

Congestive heart failure

Congestive heart failure (CHF) is a chronic, progressive problem that affects the pumping power of your heart muscle. While often simply referred to as "heart failure," congestive heart failure is a stage in which fluid builds up around the heart, causing the heart to pump blood inefficiently. Ischemia or reduced blood flow to the heart is usually caused by a blockage that can lead to a heart attack. Cardiac ischemia occurs when blood flow to your heart is reduced and the heart is prevented from receiving enough oxygen [21]. Decreased blood flow is usually due to incomplete or complete blockage of the heart arteries (coronary arteries). Cardiac ischemia, also called myocardial ischemia, can damage your heart muscle and reduce the ability of the heart muscle to pump blood. A sudden and severe blockage of a coronary (heart) artery can lead to a heart attack. Cardiac ischemia may also cause abnormal and dangerous heart rhythms. Treatment of cardiac ischemia includes improving blood flow to the heart muscle. Treatment may include medications, a procedure to open the blocked artery, or bypass surgery [22].

Angina

Angina is a type of chest pain caused by reduced blood flow to the heart. Angina is a symptom of coronary heart disease. Angina, which may also be called angina pectoris, is often defined by a feeling of pressure, heaviness, tightness, or pain in the chest. Some people who get angina express it with a feeling like when their chest is compressed between two objects or the feeling that a very heavy object is placed on their chest. Angina may be new pain that needs to be evaluated by a cardiologist. Although angina is a relatively common problem, it is still difficult to distinguish it from other types of chest pain such as pain and discomfort caused by indigestion.

Pulmonary edema (Due to congestive heart failure)

Pulmonary edema is a problem caused by the accumulation of excess fluid in the lungs. These fluids accumulate in many air sacs in the lungs and make breathing difficult. In many cases, heart problems cause pulmonary edema. But fluids can accumulate for other reasons as well. These

include: pneumonia, exposure to certain toxins and drugs, injury to the chest wall, and exercise at high altitude. Pulmonary edema that develops suddenly (acute pulmonary edema) is a medical emergency that requires immediate treatment [23].

Acute valvular diseases

Valvular heart diseases are characterized by damage to or dysfunction of one of the four heart valves. These four valves include mitral, aortic, tricuspid and pulmonary. The mitral and tricuspid valves control the blood flow between the atria and the ventricles. The pulmonary valve controls the blood flow from the heart to the lungs, and the aortic valve directs the blood flow between the heart and the aorta, and thus the blood vessels of the whole body [24]. The mitral and aortic valves are the two valves that are most frequently affected by heart valve diseases. The normal functioning of the heart valves ensures that the blood flow with the right strength is in the right direction and at the right time. In valvular heart disease, valves that are too thin become hard to open fully (stenotic) or fail to close completely (valvular regurgitation). To compensate for the poor pumping action of the heart, the heart muscles become enlarged and thickened, thus losing their elasticity and efficiency. In addition, in some cases, the accumulation of blood in the chambers of the heart greatly increases the potential for clot formation and increases the risk of stroke and pulmonary embolism. Severity of valvular heart diseases is different. In mild cases, there may be no symptoms, while in advanced cases, valvular heart disease may lead to congestive heart failure and other complications. Treatment depends on the degree of disease progression.

Cardiopulmonary problems and injuries and length of stay in ICU

Ventilator-associated pneumonia (VAP) is a type of lung infection. This problem occurs in patients who breathe with artificial breathing devices (ventilators) in the hospital for more than 48 hours. These patients are often very ill. They may have had a heart attack or stroke, a serious accident, or major surgery. They may not be able to breathe on their own because they are unconscious or sedated during treatment. Ventilators supply oxygen through a tube placed in the patient's mouth or nose, or through a hole in the front of the neck. If a microbe enters through the tube and reaches the patient's lungs, it can lead to VAP. VAP is a potentially very serious complication in patients who are already very ill. This can worsen the health condition and increase the risk of death of patients. In the following, the common diseases that are treated in the ICU department are mentioned.

Sepsis

Sepsis is a disease that begins with widespread infection throughout the body and becomes a life-threatening problem. In sepsis, the body's response to the infection creates a new problem and widespread inflammation that can lead to organ failure. While much has been learned about the way sepsis damages the body, much remains to be understood. We know that sepsis follows an infection and that certain people are more vulnerable, but why some people are so severely affected

is unclear. The most important way to stop sepsis is to prevent the infection or treat it early. An international effort to cure sepsis is underway. Rapid identification of patients with sepsis and aggressive treatment of the infection is essential for success, as is identifying the primary source of infection.

Traumatic brain injury or concussion

Traumatic brain injury or concussion includes temporary or permanent damage to brain tissue. It is usually the result of a severe blow to the head or face and is often accompanied by bleeding in the brain or swelling of the brain. Depending on the severity of the brain injury, symptoms may range from confusion, loss of consciousness, to coma, all of which may vary in duration.

Cause of traumatic brain injury

Common causes of brain injuries are: Car accidents, falls, sports accidents and industrial accidents. Treatment of traumatic brain injury includes supporting all vital systems of the body. Because the brain often swells following an injury, intracranial pressure may increase. Under these conditions, more brain damage may occur and measures to reduce intracerebral pressure may be used. The severity of traumatic brain injury varies greatly. Some patients recover completely, while others may suffer severe permanent brain damage or death.

Shock

Shock is a decrease in blood flow to vital organs (brain, lungs, heart, kidneys, etc.). Shock occurs when blood pressure and blood flow are not strong enough to reach vital organs. There are many types and causes of shock. The most common are heart failure, bleeding, or severe infection. Treatment depends on the cause of shock, but is usually aimed at restoring blood pressure and blood flow to vital organs.

Stroke

An ischemic stroke occurs when the blood flow to a part of the brain is cut off or reduced, preventing the brain tissue from receiving oxygen and nutrients. Brain cells begin to die within minutes. A stroke is a medical emergency and immediate treatment is very important. Early action can reduce brain damage and other complications.

Cause of stroke

There are two main causes of stroke: A blockage of an artery (ischemic stroke) or a leaking or burst blood vessel (hemorrhagic stroke). Some people may have only a temporary disruption of blood flow to the brain, known as a transient ischemic attack (TIA), that does not cause lasting symptoms. Effective stroke treatment can prevent long-term disability and save lives.

The specific treatments recommended depend on whether the stroke is caused by:

- A blood clot that blocks blood flow to the brain (ischemic stroke);
- Bleeding in or around the brain (hemorrhagic stroke);

Treatment usually involves taking 1 or more different medications, although some people may also need surgery.

Some of the risk factors that endanger people's heart and lung health are:

- **Old age:** Problems and diseases of the heart and lungs often happen in old age and in elderly people more than others, and considering that the immune system of many elderly people has weakened over time and they cannot fight against strokes, heart attacks, nervous attacks, etc., They lose their lives if they resist.
- **Family history:** Many people who die due to heart disease and lung problems may have a family history of premature heart disease and due to genetic issues, vascular and lung diseases without a specific cause and underlying disease.
- **High blood pressure:** Increased blood lipids, continuous smoking, inactivity and vascular disorders such as blood coagulation and...

New data is also emerging that shows a correlation between Covid-19 and dental health. Research results in 2021 in oral radiology showed that almost 75% of the participants with severe dental disease were hospitalized due to Covid-19. According to the researchers, this case is probably also related to the SARS-CoV-2 virus; The virus that causes Covid-19 disease. There are receptors in the body called ACE2 that allow SARS-CoV-2 to enter the body's cells. Many of these receptors are located in the mouth, tongue and gums. Those who are careless in taking care of their oral health may have more ACE2 receptors and thus may be more susceptible to complications from Covid-19. However, more research is needed in this area. Although research is always evolving, we do know that some oral symptoms are associated with Covid-19. These symptoms include bleeding gums, rashes in the mouth, white coating on the tongue, yellow or discolored teeth, and loss of teeth, but it does not mean that you will not experience dental problems if you have Covid-19.

Researchers stated: Toothache during or after recovery from Covid-19 can be treated with 400 mg of ibuprofen. They added: Ibuprofen is more effective than acetaminophen and using a soft cloth soaked in cool water and placing it on the outside of the cheeks can also help. If pain relievers do not relieve the problem, a dentist should be contacted. If you think you may be developing an infection or thrush, your doctor may prescribe antifungal medications. Research results in 2020 show that those who prioritize oral and dental hygiene can reduce the severity of the symptoms of Covid-19 if they are infected with the virus. Tooth care includes flossing at least once a day, brushing your teeth twice a day with fluoride toothpaste, changing your toothbrush every three to four months, eating healthy, avoiding excessive sugar consumption, not smoking and clean. Keep all the dental equipment.

Conclusion

A group of researchers conducted a new study to investigate the impact of the corona virus on oral and dental health and evaluated approximately 65,000 people with the disease of Covid-19. The results of the studies show that four out of every 10 people with the disease of Covid-19 have experienced a change in the sense of taste or its loss, while more than 43% of patients suffer from dry mouth. Some people participating in the study stated that the parts above or below their tongue and gums were sore, even mild Covid-19 disease may cause these problems among patients.

However, it is not yet clear why only a few patients experience the mentioned problems. According to the researchers, oral and dental problems are not exclusive to the Covid-19 disease and other diseases may also cause these problems. Researchers have advised people with Covid-19 disease to maintain their oral and dental health during the illness. Dry mouth increases the risk of tooth decay, so it is necessary for people to brush twice a day with fluoride toothpaste, floss once a day, reduce the number of snacks and avoid sugary foods and drinks. The results of a recently published study show that Covid-19 causes heart problems, including irregular heartbeat and angina, and worsens pre-existing heart conditions. Italian researchers who conducted this study say: More than 14% of patients who are hospitalized due to corona infection suffer from heart complications caused by this disease. In addition, about 13% of the patients who are admitted to the hospital due to this virus have already suffered from cardiovascular conditions. The data of this study shows that about 10% of corona patients who were already suffering from cardiovascular problems or people who developed heart problems after contracting corona died.

Researchers from the University of Catanzaro in Italy, who conducted this study, wrote in an article, the results of this study showed that both pre-existing cardiovascular problems and suffering from cardiovascular complications related to corona with the death rate and mortality in patients infected with Covid-19 is related. According to these researchers, the findings of this study, which is based on the analysis of 21 studies that include more than 77,300 hospitalized patients infected with Covid-19 in American, Asian and European hospitals, are a confirmation of the proof that infected people with heart disease face an increased risk of more serious Covid-19 diseases as well as heart damage. Although most of the patients with Covid-19 have weak symptoms, but the elderly and people with underlying diseases such as cardiovascular disease, chronic lung disease and diabetes are at risk of contracting serious cases of corona. This study, published in the journal PLOS ONE, showed that more than 36% of hospitalized patients had high blood pressure before hospitalization, and less than 20% of them had diabetes.

The data showed that about 11% of these patients were smokers and about 34% of them were obese or overweight. The researchers said that less than 12% of the patients had a history of coronary artery disease before being admitted to the hospital due to corona approximately 10% had heart failure and slightly more than 5% had chronic obstructive pulmonary disease or COPD. These data showed: when these patients were admitted to the hospital due to corona, more than 10% of them showed evidence of damage to the heart and almost 10% of them had angina. Also, about 18% of them had an irregular heartbeat, 4% of them had a heart attack, and 2% of them

had chronic or serious heart failure. Although the overall mortality rate due to heart complications in patients with Covid-19 was 9.6%, but about 42% of patients died due to heart disease caused by this virus or worsening of their diseases. They died due to this virus in the intensive care unit of the hospital. These researchers emphasize: Doctors should be aware of the potential impact of cardiovascular conditions and their complications on patients with Covid-19, and this issue needs wider and more frequent monitoring.

References

[1]. Wang C, Horby PW, Hayden FG, Gao GF. A novel coronavirus outbreak of global health concern. The Lancet. 2020; 395(10223):470-3.
[2]. Adhikari SP, Meng S, Wu YJ, Mao YP, Ye RX, Wang QZ, et al. Epidemiology, causes, clinical manifestation and diagnosis, prevention and control of Coronavirus Disease (COVID-19) during the early outbreak period: A scoping review. Infectious Diseases of Poverty. 2020; 9:29.
[3]. Armitage R, Nellums LB. COVID-19 and the consequences of isolating the elderly. The Lancet Public Health. 2020; 5(5):e256.
[4]. Gerst-Emerson K, Jayawardhana J. Loneliness as a public health issue: The impact of loneliness on health care utilization among older adults. American Journal of Public Health. 2015; 105(5):1013-9.
[5]. Lai M-M, Lein SY, Lau SH, Lai ML. Modeling age-friendly environment, active aging, and social connectedness in an emerging Asian economy. Journal of Aging Research. 2016; 2016:2052380.
[6]. Ferreira LN, Pereira LN, da Fé Brás M, Ilchuk K. Quality of life under the COVID-19 quarantine. Quality of Life Research. 2021; 30(5):1389-1405.
[7]. Asgari M, Choubdari A, Skandari H. [Exploring the life experiences of people with Corona Virus disease in personal, family and social relationships and Strategies to prevent and control the psychological effects (Persian)]. Counseling Culture and Psycotherapy. 2021; 12(45):33-52.
[8]. Khodabakhshi koolaee A. Living in home quarantine: Analyzing psychological experiences of college students during Covid-19 pandemic; Journal of Military Medicine. 2020; 22(2):130-8.
[9]. Rahmatinejad P, Yazdi M, Khosravi Z, Shahi Sadrabadi F. [Lived experience of patients with Coronavirus (Covid-19): A phenomenological study (Persian)]. Journal of Research in Psychological Health. 2020; 14(1):71-86.
[10]. Chee SY. COVID-19 pandemic: The lived experiences of older adults in aged care homes. Millennial Asia. 2020; 11(3):299-317.
[11]. Brooke J, Clark M. Older people's early experience of household isolation and social distancing during COVID-19. Journal of Clinical Nursing. 2020; 29(21-22):4387-402.
[12]. Elo S, Kyngäs H. The qualitative content analysis process. Journal of Advanced Nursing. 2008; 62(1):107-15.
[13]. Thanakwang K, Soonthorndhada K, Mongkolprasoet J. Perspectives on healthy aging among T hai elderly: A qualitative study. Nursing & Health Sciences. 2012; 14(4):472-9.

[14]. Graneheim UH, Lundman B. Qualitative content analysis in nursing research: Concepts, procedures and measures to achieve trustworthiness. Nurse Education Today. 2004; 24(2):105-12.
[15]. Memaryan N, Rassouli M, Nahardani SZ, Amiri P. Integration of spirituality in medical education in Iran: A qualitative exploration of requirements. Evidence-Based Complementary and Alternative Medicine. 2015; 2015:793085.
[16]. Caleo G, Duncombe J, Jephcott F, Lokuge K, Mills C, Looijen E, et al. The factors affecting household transmission dynamics and community compliance with Ebola control measures: a mixed-methods study in a rural village in Sierra Leone. BMC Public Health. 2018; 18:248.
[17]. Desclaux A, Badji D, Ndione AG, Sow K. Accepted monitoring or endured quarantine? Ebola contacts' perceptions in Senegal. Social Science & Medicine. 2017; 178:38-45.
[18]. Uribe-Rodriguez AF, Valderrama L, DurÁN Vallejo D, Galeano-Monroy C, Gamboa K, Lopez S. Developmental differences in attitudes toward death between young and older adults. Acta Colombiana de Psicología. 2008; 11(1):119-26.
[19]. Hacihasanoğlu R, Yildirim A, Karakurt P. Loneliness in elderly individuals, level of dependence in Activities of Daily Living (ADL) and influential factors. Archives of Gerontology and Geriatrics. 2012; 54(1):61-6.
[20]. Jiang X, Niu Y, Li X, Li L, Cai W, Chen Y, et al. Is a 14-day quarantine period optimal for effectively controlling coronavirus disease 2019 (COVID-19)? MedRxiv. 2020.
[21]. Tan M, Karabulutlu E. Social support and hopelessness in Turkish patients with cancer. Cancer Nursing. 2005; 28(3):236.
[22]. 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
[23]. B Shakiba, N Torabi, R Alimoradzadeh, R Maghsoudi, Medical Workplace Civility Watch: An Attempt to Improve the Medical Training Culture, Journal of Iranian Medical Council, 2022, 5 (1), 227-228
[24]. 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
[25]. 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, Neuro Quantology, 2022, 20 (8), 632-642
[26]. F Zabihi, MA Abbasi, R Alimoradzadeh, The Association of Serum Albumin Level with Cognition and Daily Function in Patients Undergoing Hemodialysis, Annals of the Romanian Society for Cell Biology, 2021, 2573–2579

[27]. 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
[28]. 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
[29]. 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
[30]. 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
[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]. M Abbasi, Afrooz Nakhostin, Fatemeh Namdar, Nasim Chiniforush, Masomeh Hasani Tabatabaei, The Rate of Demineralization in the Teeth Prepared by Bur and Er: YAG Laser, J Lasers Med Sci, Spring 2018;9(2):82-86.
[33]. 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
[34]. 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
[35]. MB Abhari, PF Afshar, R Alimoradzadeh, H Mirmiranpour, Comparing the effect of including omega-3 to treatment regimen in elderly patients with ulcerative colitis with placebo: A randomized clinical tria, Immuno pathologia Persa, 2019, 6(1), e10-e10
[36]. MM Fard, Effects of Micronutrients in Improving Fatigue, Weakness and Irritability, GMJ Med. 2021, 5 (1): 391 395
[37]. 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, 2022, 4 (6), 463-472
[38]. 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, 2022, 4 (6), 463-472
[39]. N Zaimzadeh, S Ziaie, N Mohammadzadeh, H Alizadeh Otaghvar, 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

[40]. N Zaimzadeh, S Ziaie, N Mohammadzadeh, H Alizadeh Otaghvar, et al., Comparison of vitamin D dietary intake among four phenotypes of polycystic ovary syndrome and its association with serum androgenic components, Razi Journal of Medical Sciences, 2018, 25 (2), 87-96
[41]. 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
[42]. R Alimoradzadeh, H Mirmiranpour, P Hashemi, S Pezeshki, SS Salehi, 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
[43]. 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
[44]. R Alimoradzadeh, MA Abbasi, F Zabihi, H Mirmiranpour, Effect of Anesthetics on Oxidant and Antioxidant Parameters After Inguinal Hernia Surgery in Older Patients, Iranian Journal of Ageing, 2021, 15(4), 524-533
[45]. S Golalipour, Z Soleimany darinsoo, N Qaderi, H Ghazipoor, M Salahi, Examination of Dental Problems and Radiological and Cardiac Evaluations in Patients Affected by Covid-19, Neuro Quantology, 2022, 20 (8), 1519- 1527
[46]. Ghaibi E; Soltani Manesh MR; Bushra M; Gilani Z; Salimi Nabi K; Zarif F., Comparison of Organizational Citizenship Behavior and Job Creativity between Male and Men's Education Personnel 1 Ahwaz, Eurasian Journal of Chemical, Medicinal and Petroleum Research, 1(2), 2022, 49-57
[47]. Ghaibi E; Soltani Manesh MR; Jafari Dezfouli H; Zarif F; Jafari Z; Gilani Z., Comparison of Marital Satisfaction, Emotional Divorce and Religious Commitment among Nurses and Staff of Ahvaz Government Hospitals, Eurasian Journal of Chemical, Medicinal and Petroleum Research, 1(1), 2022, 33-39
[48]. Johnson A., Investigation of Network Models Finite difference Method, Eurasian Journal of Chemical, Medicinal and Petroleum Research, 2(1), 2023, 1-9
[49]. Lo Han K., Investigation of Heavy Polyethylene Catalytic Pyrolysis, Eurasian Journal of Chemical, Medicinal and Petroleum Research, 1(2), 2022, 64-70
[50]. Lo Han K., Investigation of Network Models as a Numerical Method for Solving Groundwater Equations, Eurasian Journal of Chemical, Medicinal and Petroleum Research, 1(1), 2022, 1-9
[51]. 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
[52]. 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, 2022, 4 (6), 463-472

[53]. Nazardani SZ; Nourizadeh Dehkordi SH; Ghorbani A., A comprehensive evaluation of the Sports Physiotherapy curriculum. Eurasian Journal of Chemical, Medicinal and Petroleum Research, 2(1), 2023, 10-16
[54]. Rebout F., Effect of Polymers on Transient Reynolds Number Change in Pipe Flow and Reduction of their Coefficient of Friction, Eurasian Journal of Chemical, Medicinal and Petroleum Research, 1(1), 2022, 20-32
[55]. Rebout F., Friction Coefficient Pressure Gradient in Fully Developed Flow, Eurasian Journal of Chemical, Medicinal and Petroleum Research, 1(2), 2022, 58-63
[56]. M Eshagh, E Ahangari, Compare coping styles and marital satisfaction in the patients with the bipolar disorder with the normal people , SRPH Journal of Medical Sciences and Healthcare Management, 2020; 2(3), 1-9
[57]. S Abbasian, M Kargar Moghaddam, B Nazari; The Effect of High-Intensity Treadmill Training on Motor Function in Patients with a Stroke, SRPH Journal of Medical Sciences and Healthcare Management, 2022; 4(1), 1-3