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Review Paper on Musculoskeletal Disorders

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Abstract: ***The work is about musculoskeletal disorders (MSDs). In today world musculoskeletal disorders are the major problem. It increased dramatically from the 1980 because workload have been increased. Most of them are suffering from arthritis, sprain, strain and there are a lot of diseases also through which peoples are suffering from MSDs. It is characterized into many ways like according to pain stress, mobility, bones muscles and ligaments. There are many surveys done to study musculoskeletal disorders across all over the world.***

Musculoskeletal disorders are happened because of poor health, increase in weight, fatigue, stress or drugs, smoke can also be the cause of MSDs. We see every day there is a discovery of new disease, new cause of happening a MSDs or new symptoms. In Mexico factories MSD is a major and increasing gradually year by year.

Low back issue and shoulder pain is very common which happened due to machines and their work load management for example wrong design of machines, vibrations in machines and etc. Many machines and tests are available to diagnose musculoskeletal disorders in which most commonly used tests are blood test which comes under the category of laboratory test. Xray's, MRI, CT scan are also used to test MSDs.

I. INTRODUCTION

With the term MSD (Musculoskeletal Disorder) we refer to injuries or pain in the human musculoskeletal system. Sometimes called "Ergonomic Injuries" occur when the body uses ligaments, muscles and tendon to do work or activities. Every day, we use our muscles, ligaments and joints to move, lift or carry objects, these tasks require a lot of pressure or effort on our body which causes pain or injury called a musculoskeletal disorder, it includes wide range of inflammatory and degenerative conditions affecting the muscles, tendons, ligaments, joints, structures that support the limbs, neck, peripheral nerves, and supporting blood vessels. These includes clinical syndromes such as tendon inflammations and related conditions (tenosynovitis, epicondylitis, bursitis), nerve compression disorders (carpal tunnel syndrome, sciatica), and osteoarthrosis, as well as less well standardized conditions such as low back pain, myalgia and other regional pain syndromes are known as pathology.

There are many examples of MSDs, Like carpal tunnel syndrome, epicondylitis, hand-arm vibration syndrome. Most common Musculoskeletal diseases are trauma, back pain and arthritis for which we have to visits to physicians' offices, emergency departments and hospitals time by time. Musculoskeletal disease are short lived diseases that happened suddenly such as fractures, sprains and strains etc.

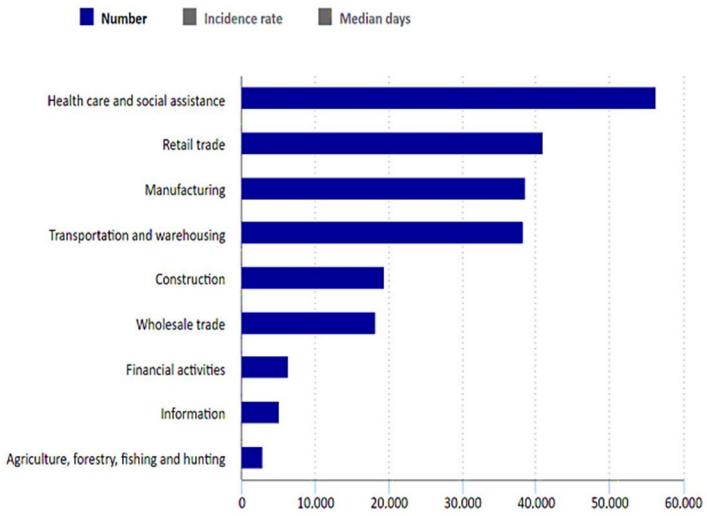
Musculoskeletal conditions are typically characterized by pain and it affects in mobility, dexterity and overall level of functioning, reducing people's ability to work. musculoskeletal conditions include many diseases that affects our body parts like joints, bones, muscles, spine and multiple body areas such as for joints osteoarthritis, rheumatoid arthritis, psoriatic arthritis and gout etc. Osteoarthritis is the most common form of arthritis. it causes chronic joint inflammation. Those people who have arthritis they feel joint pain and stiffness.

In bones MSDs include osteoporosis, osteopenia and associated fragility fractures. Back and neck pain affect the spine. in Muscles sarcopenia is most common disease in which mainly body loses skeletal muscle mass and strength. There are approximately 1.71 billion people have musculoskeletal disorder over the world. Mostly MSD cases are seen in the age group of 45 to 54 years. According to WHO

The Survey of Occupational Injuries and Illnesses (SOII) collects data on MSDs for cases involving days away from work (DAFW). In 2018, there were 900,380 Days Away from Work (DAFW) cases in the U.S. private sector with 272,780 (or 30 percent) being MSDs cases. But in 2011, there were 311,840 cases involving MSDs.

The incidence rate of MSD cases was 35.4 in 2011 and 27.2 per 10,000 full time workers in 2018. The work away days for MSD cases was 12 in 2018 and was 11 days in 2011. Manufacturing, healthcare, Retail trade and social assistance had 50 percent of all MSD cases in the private sector in 2018.[1]

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[2] Median Days from work of injuries

II. CAUSES

MSD are a common problem over the worldwide. Mainly it happens due to overload, fatigue and etc. Mains causes like:

Workplace in which MSD occurs due to maintaining same posture over long work days. Even natural position can be the reason of MSD like low back pain. There are some others reasons like Poor health persons who are suffering from other chronic diseases which affect their health or if they do smoking and drinking it also affect their health, poor rest and recovery. When we have a fatigue, it can also be the reason of injuries, poor nutrition's, fitness and hydration, or poor work practice person who are new in that work or inexperienced it can create unnecessary stress on their bodies that increase and decreases their body ability to properly recover. Gender can also be the cause of musculoskeletal disorder. According to the 2015 European Working Conditions Survey (EWCS**),** 60% of women workers in the EU were suffering from more than one MSD. A high proportion woman is employed in company for jobs were involved with prolonged sitting (62%), repetitive hand or arm movements (62%) and the use of computers (62%), for at least a half of their working time – all factors are resulted into an increased risk of developing MSDs. Women workers are exposed to increased MSD risk factors because of their tools, work equipment and personal protective equipment (PPE) which have been traditionally designed for the male shape and body size. If work equipment were not the correct designed or were set up wrongly this led to a poor working posture and most important this led to an increased risk of MSDs.[3] Training and awareness raising are also needed to improve workplace safety and health for women. Obesity is also a factor. Increase in the weight of a person a lead to increase the amount of stress and strain on the weight bearing joints extra weight can lead many other disorders like arthritis, tendonitis and bursitis.

There are some psychosocial factors that cause MSDs. In this body show different symptoms like increase muscle tension, increase blood pressure and fluid pressure also. The physiological changes that individuals experience thanks to stress are intended to organize someone to physically resolve dangers, problems, or challenges within the short-term time range. When the challenge has been resolved, the strain response within the body shuts down. Similarly, when the challenge has not been resolved, these physiological changes are sustained and also the body remains in "stress mode". In many cases, when stress is caused by psychological and social factors, these problems often cannot be resolved by a one-time response caused by physical stress. In these cases, the psychological aspects of the workplace will cause the body to be trapped in "stress mode." [4]

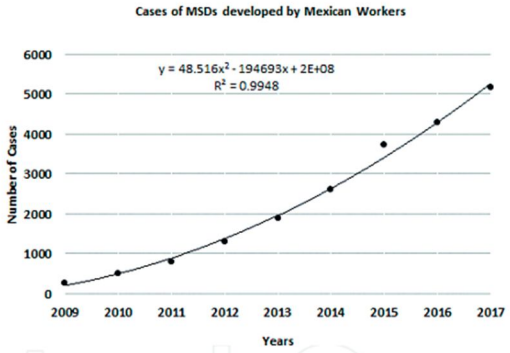
III. METHODOLOGY

It is the term which is used to detect musculoskeletal disorders like in industrial workplaces.as we know that this disease is very common and impact of musculoskeletal disorders in increase day by day. Now it is the 2nd cause of living with disability. In Mexico According to 2016 in Mexico Musculoskeletal disorders were 3rd greatest cause. Now we took global data and study MSDs in Mexico from 1990 to 2016. From 2009 to 2016 data has been shown below in table. How year by year number of cases increased in different categories like work-related illnesses, work-related injuries and their percentage.

Year	Work-related illnesses	Work-related injuries	Percentage of MSDs with respect to work-related injuries
2009	266	4101	6.49
2010	513	3466	15.80
2011	788	4105	19.20
2012	1309	4853	26.97
2013	1893	6364	29.75
2014	2604	8301	31.37
2015	3722	12,009	30.99
2016	4273	12,622	33.85
2017	5155	14,159	36.41
Total	20,523	69,980	29.33

[5]Cases Year by Year

As we can see in the table how much cases increased year by year. Starting with only 266 cases in 2009 it reached to 5155 in 2017 as in work-related injuries situation is critical starting with 4101 this also a big number

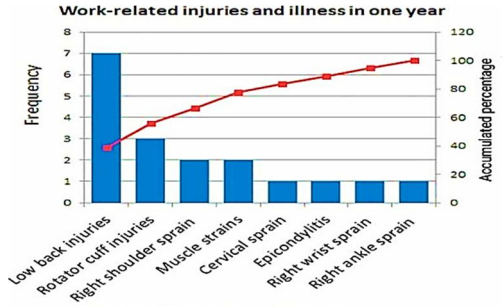


[6]MSD cases developed by workers in Mexico

A. Analysis Of Inputs

There are three main analyses of MSD in industry in which 1st one is

1) *Human Factors:* AS we discussed in above section. main cause Is poor experience, poor practice, poor health this are the main human factors are the main cause of happening MSDs
2) *Work Place Conditions:* This is also an interesting cause of MSDs. in industry there is a polishing screener machine this is a very poor design made by engineers, they didn't design on the requirement if workers have to polish that machine, they have to sit in a uncomfortable condition like this machine is very tight which create very less space for legs, inconvenient arm reached that cause a wrong posture and leads to a discomfort which converted into a body pain.
3) *Nonergonomic Task Content:* In this category Disorder is caused due to sitting or working in one position for a long time. Or when we sit on a machine it causes vibrations or radiations coming from electronic devises, working in a radioactive lab or factories affect your body parts which comes under those radiations It is also a factor which can cause musculoskeletal disorders.



[6] Work-Related injuries

As we can see in above figure lower back injuries are increasing in a high rate. It shows that frequency rate of different disorders and how their accumulated percentage increasing.

IV. DIAGNOSIS

Musculoskeletal disorder can be diagnosed by using some medical methods like laboratory tests, imaging tests, and others diagnostic procedures

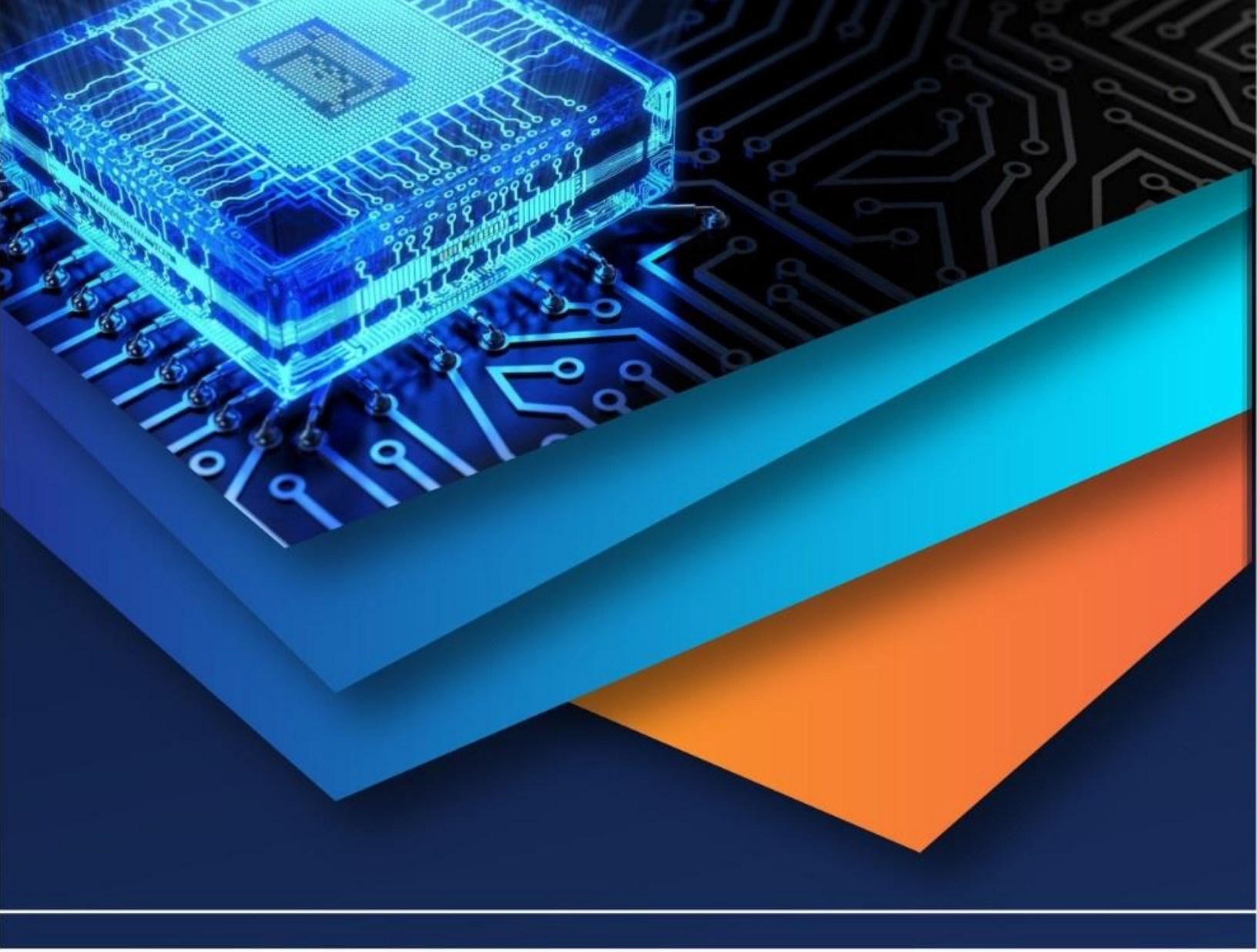
In laboratory tests methods we take blood to diagnose MSDs there are a lot of tests for example in rheumatoid arthritis we have to do blood test to check rheumatoid factor or anti-CPP (anti-cyclic citrullinated peptide). In systematic lupus erythematosus we do blood test to check antinuclear antibodies and antibodies to DNA. there are some others laboratory tests also in which check the gene of persons using this gene we identify that person is suffering from which disorder or disability for example (HLA-B27) people who have this gene they are at a risk of development of spondylarthritis, it is a group of disorders in which inflammations occurs, redness and rashes etc.

Using imaging tests doctors can diagnose musculoskeletal disorders. Most common used test to diagnose MSD is Xray. Xray's are painless method to identify the disorder, person have to sit on the x ray machine then doctor take x-ray and diagnose that issue .it is mainly use for disease like osteoarthritis or rheumatoid arthritis. But there is a disadvantage also x-ray don't show soft tissues like muscles ligaments nerves. To identify the disorder in muscles or tissues we use Arthrography it is like an x-ray, in which we inject a radiopaque dye into the joint space to check the structures of ligament. It is also used for torn ligament and fragmented cartilage in the joint. CT (computed tomography) and MRI (magnetic resonance imaging) are others two to check MSDs MRI are used to detect inner parts like nerves ligament damage and neurons etc. CT scan is used to detect bone and joints issue. it can also detect conditions like cancer and heart disease. However, MRI give better image sensing than CT in some case like small fracture of hip and pelvis. MRI take more time than CT and MRI are expensive also. DXA (Dual-energy x-ray absorptiometry) is an accurate way to detect the bone density which is good to identify diseases like osteoporosis or osteopenia. DXA can also predict the bone fracture. This test is very quick and painless. Ultrasonography is used by doctors to identify inflammations around the bone or joints, tendons.[7]

Some other diagnostic procedures are also available like nerve and muscle tear test in these electric impulses is passed in the muscles this technique is also called Electromyography.it can study neuromuscular junction, nervous system, muscles (such a s carpal tunnel syndrome and ulnar nerve palsy). Arthroscopy help to determine inflammation of synovium lining in the joint, cartilage tears and tendon. in this technique a small fibreoptic scope is inserted into a joint space, with the help of this hole doctors see inside the joint and project an image in video monitor. arthritis and joint injuries can be removed and repaired using arthroscopy. It is a good technique and less risk of infection. Another method is joint aspiration also called as arthrocentesis it is used for certain joint issues. it is a painful method that why first doctor give anaesthetic to that region where we have to diagnose, then doctor inserts a larger needle in it (with the help of ultrasonography), and take out joint fluid also called synovial fluid and then check this fluid under microscope, after analysis the joint fluid doctor can diagnose the problem. These are some methods or technique used to identify the musculoskeletal disorders.

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