Risk Factors for Carpal Tunnel Syndrome (CTS)

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Abstract

Carpal Tunnel Syndrome (CTS) is known to be the most common type of compression neuropathy of the upper extremities. Carpal Tunnel Syndrome (CTS) is caused by compression of the nerve that runs through the carpal tunnel, namely the median nerve. Carpal Tunnel Syndrome (CTS) is very often experienced by workers whose daily activities always use repetitive movements of the wrist and a fixed position for a long time. Several factors are known to be a risk factor for CTS, such as repetitive movements with force, pressure on the muscles, non-ergonomic work postures, and others. Carpal Tunnel Syndrome (CTS) is a syndrome that can actually be prevented because there are no risk factors that cannot be changed except for age.

Keywords : Carpal Tunnel Syndrome, individual factors, occupational factors

1. Introduction

A survey conducted by the National Health Interview Survey (NHIS) estimated the prevalence of CTS in the adult population at 1.55%. It has been reported that the annual incidence rate of CTS is 276 out of 100,000. Carpal Tunnel Syndrome is more common in women than men with a prevalence of 9.2% and 6%, respectively. Although the incidence of CTS is common in various age groups, the rate increases in the 40-60 year age group[7].

In Indonesia, the prevalence of CTS in work problems is unknown because very few occupational disease diagnoses have been reported. Various studies have reported that CTS is one of the types of CTDs that causes symptoms most quickly in workers. Research on high-risk jobs on the wrist and hands found a prevalence of CTS between 5.6% - 14.8%. The causes of CTS can occur due to direct trauma to the carpal tunnel, repetitive wrist flexion and extension positions, edema, systemic disorders[5].

A job has a risk of accidents and occupational diseases (PAK). Carpal Tunnel Syndrome (CTS) is a disorder of the bones caused by repeated long-term movements in a static position so that the blood supply to the wrists, hands and nerves is disrupted. Several individual risk factors for CTS are age, gender, obesity, systemic disease, and work with repetitive pressure on the wrist. These factors can cause compression of the median nerve[2]. Research on CTS has been carried out in various work sectors. For this reason, researchers want to conduct a literature review regarding the risk factors for CTS events.

2. Carpal Tunnel Syndrome Risk Factors

Several individual risk factors for CTS are age, gender, obesity, systemic disease, and work with repetitive pressure on the wrist. These factors can cause compression of the median nerve[2]. Several factors are known to be a risk factor for CTS, such as repetitive movements with force, pressure on the muscles, work postures that are not ergonomic, and others. Carpal Tunnel Syndrome (CTS) is a syndrome that can actually be prevented because there are no risk factors that cannot be changed except for age. [1].

1. Individual Factors

a. Age

Increasing age can increase the risk of developing carpal tunnel syndrome. Carpal Tunnel Syndrome most commonly occurs at the age of 29-62 years, the risk increases at the age of 40-60 years[3]. Age is one of the risks that is closely related to the incidence of CTS, this is because the older a person is, the synovial fluid will decrease so that it can cause swelling in the joints[4].

b. Gender

According to Merijanti (2005), women have a three times greater risk of developing carpal tunnel syndrome than men. This is due to the narrower size of the carpal tunnel in women and the influence of estrogen that women have[4].

c. Obesity

Based on the research of Kouyoumidjian (2000), states that CTS occurs due to compression of the median nerve under the transverse carpal ligament which is associated with increased weight and BMI[6]. Obesity is an intrinsic risk factor for CTS[10]. The America Obesity Association found that 70% of people with CTS are overweight. Each increase in BMI value of 8% increases the risk of CTS[4]. According to Jeremy (2005), someone who is overweight has a potential risk of developing CTS because there is a pile of enlarged tissue found on the wrist. The presence of a pile of tissue, both large muscle and fat, can trigger compression of the median nerve which is located in the carpi canal, so that it can trigger CTS[11].

d. Disease History

- Fracture/Dislocation

The occurrence of tendinitis due to bone fractures or dislocations can also exacerbate the occurrence of Carpal Tunnel Syndrome. This damage can be the cause of compression of the nerves and cause CTS. Emphasis on the carpal tunnel will cause either reversible or irreversible damage. Increased intensity and long enough duration will reduce blood flow in the peripheral blood vessels. In the long term, blood flow will affect capillary circulation and ultimately affect the permeability of blood vessels in the wrist[8].

- Rheumatoid Arthritis

According to the American Society for Surgery of The Hand (2011), Rheumatoid Arthritis can narrow the carpal tunnel. The narrow carpal tunnel can directly cause CTS due to compression on the median nerve[4].

- Diabetes

According to Dragichi (2020), there are various complications from diabetes, one of which is the emergence of CTS which is a form of diabetic neuropathy. The existence of this neuropathy is caused by

blood viscosity so that it has an impact on ischemia, a decrease in blood supply in the median nerve and triggers the occurrence of CTS[11].

2. Occupational Factors

a. Years of service

Factors that influence the emergence of work-related musculoskeletal disorders include years of service. Working periods ranging from >1 or ≥2 years are felt to have contributed to the emergence of work-related musculoskeletal disorders. Carpal Tunnel Syndrome can occur due to continuous pressure on the carpal tunnel for months or even years[9].

b. Length of working

According to Suma'mur (2009), working time for a person determines his health, efficiency, effectiveness, and work productivity. The length or time a person works well in a day is generally 6-10 hours. In one week people can only work well for 40-50 hours. Extension of working time that exceeds the ability of workers is often not followed by the emergence of high work efficiency, but instead can have an impact on decreasing work productivity, the emergence of fatigue, and work accidents[9]. The increased risk of CTS is in line with the increase in length of service. The longer working period will cause the repetition of finger movements to be even longer[12]. According to Sakti (2013), long hours of work with the wrist flexed or extended, that is, the condition of the wrist flexed and extended for a long period of time can be at risk of developing CTS due to obstruction of blood flow to the tissue and tissue ischemia. [11].

c. Wrist Posture

Work attitude is a work position that is naturally formed by the worker's body as a result of interacting with the facilities used or work habits. An inappropriate work attitude can cause physical complaints in the form of muscle pain (Musculoskeletal Complaint). This is due to the result of unnatural work postures caused by the characteristics of task demands, work tools, and work stations that are not in accordance with the abilities and limitations of workers[8]. The application of an ergonomic work attitude can make a person experience a decrease in musculoskeletal function by reducing muscle tension[13]. Deviations in wrist posture will reduce the worker's ability to grip tightly and decrease clamping strength. The angle between the tendons and the finger bones can change when there is a deviation in the posture of the wrist. This results in compression of the flexor tendons of the fingers that oppose the structure of the wrist and the walls of the carpal tunnel so that the ability and strength to clamp decreases[14].

d. Repetitive movements

Repetitive movements are a series of movements that have slight variations and are carried out every few seconds, which can result in fatigue and tension in the muscles and tendons[6]. Posture of the hands and wrists is at risk if the movements are repeated or the frequency is as much as 30 times a minute and as many as 2 times per minute for the limbs such as the shoulders, neck, back and legs[9]. The higher the frequency of repetitive movements, the higher the risk of Carpal Tunnel Syndrome[9]. Increasing the repetition of the same movements every day will increase the risk of inflammation of the tendons, this inflammation causes compression of the nerves. Repetitive motion will increase the pressure on the carpal tunnel which will cause damage that is either reversible or irreversible. An increase in intensity and a sufficiently long duration will reduce blood flow in the peripheral blood vessels, in the long term the blood flow will affect the capillary

circulation flow and will ultimately have an impact on the permeability of the blood vessels in the wrist[14].

e. Personal Protective Equipment (PPE)

Personal Protective Equipment (PPE) is a device used by workers to protect themselves from potential hazards and work accidents that may occur in the workplace. According to Tarwaka (2008), the use of PPE by workers while working is an effort to avoid exposure to hazards in the workplace. Even though this effort is at the last level of prevention, the application of personal protective equipment is highly recommended[8]. The use of PPE is able to minimize and dampen the effects of vibration received by workers, so that workers who use PPE will have a risk or potential for exposure to danger due to a lower level of vibration intensity than workers who do not use PPE at all. Hand protective equipment (hand tool) is a protective device that functions to protect the wrist against vibration. The use of PPE such as gloves made with a special material, namely elastic rubber, can be useful for supporting and limiting movement of the wrist[10].

3. Conclusion

The results of the study of 16 articles resulted in individual factors and work factors affecting CTS. With individual factors, that is, gender has the most influence on CTS and work factors, namely years of service and length of work because it affects repetition of wrist flexion, has the most effect on CTS.

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