

Prevalence of Overuse Syndrome of Wrist in Food Delivery Employees

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Abstract

Background: The rapid growth of online food delivery services has spotlighted the occupational hazards faced by food delivery employees, particularly the prevalence of wrist overuse syndrome. This condition, caused by repetitive movements, is exacerbated by the nature of delivery work, including continuous gripping of handlebars, smartphone use, and lifting heavy bags. Ergonomic challenges and pressure to meet delivery deadlines compound the risk. This study examines the prevalence of overuse syndrome of the wrist among food delivery employees, a population increasingly reliant on repetitive wrist movements due to the demands of their occupation.

Methods: The design was a quantitative, descriptive study utilising a self made questionnaire, developed specifically for this research and Numerical Pain Rating Scale. The questionnaire contained questions on personal and work demographics, with questions pertaining to overuse of wrist due to constant bike riding activity.

Results: The survey shows that many food delivery workers have wrist problems because they work long hours and ride bikes. An overwhelming 88.89% of respondents reported working long hours, while 88.89% experienced wrist pain during bike riding. Additionally, a substantial 81.82% faced difficulties bending their wrists, and 71.72% experienced aggravated pain during the daytime. These figures indicate a widespread issue affecting the majority of workers surveyed. Moreover, significant proportions reported symptoms such as swelling (21.21%), numbness after bike riding (63.64%), and difficulty gripping objects (52.53%), further emphasising the severity of the problem.

Conclusion: In the present study, we found that the food delivery employees show the greater prevalence of overuse syndrome of wrist. Because of lack of awareness and knowledge about prior risk factors, symptoms, working hours and work related risk factors and also due to lack of professional guidance about preventive measures and broad knowledge about overuse syndrome of wrist.

Keywords: Overuse syndrome, wrist, food delivery employees.

Introduction

In the world of delivery, where speed and efficiency are essential, bike riders play a crucial role in getting packages to their destinations quickly. Riding a bike, is a demanding task, straining psyche and body, especially the upper extremity.^[1] Many conditions may befall it, orthopaedic to neurological conditions. A common diagnosis is overuse syndrome – a term applied to a wide range of symptoms or disorders.^[1] Overuse syndrome is a term used synonymously with repetitive strain injury and cumulative trauma disorder. Work-related musculoskeletal injuries (WRMSI) are painful problems that happen in the

muscles, tendons, and nerves while doing tasks at work. They can occur because of the physical work we do every day. Musculoskeletal disorders can be like episodes of pain where it gets better and worse over time or temporary where pain goes away with rest or changing how we do activities. But sometimes, depending on the body part affected and how much strain it gets, these problems can become long-lasting or permanent.^[2-5] Injuries or disorders can be divided into two types based on how long they last and how they happen at work. One type comes from doing the same activities over many years during our work life (i.e. occupational), and the other type comes from short-term strain causing sudden health problems (i.e. non-occupational). The long-term strain can lead to ongoing health issues.^[2,6] The main cause of disorders/ injuries affecting muscles, tendons, joints, ligaments and bones are attributed to mechanical overload of the respective biological structures.^[2,6,7] Doing the same movements over and over again at work can make our muscles and tendons tired and can cause injuries. Also, when we hold our body in uncomfortable positions, joints can get hurt more easily. When we combine doing the same movements a lot, doing them forcefully, and holding awkward positions, it increases the chances of getting hurt at work and putting strain over the underlying body structures.^[2,3] In addition to mechanical overload the duration of exposure primarily determined by the number of repetitions per day as well as total exposure time (hours per day or days per month) are important factors in the development of overuse injuries.^[2,6] When our body parts are in awkward, tight, or unbalanced positions for a long time, they can get overloaded, causing injuries.^[2,4] Upto 60 % of work related injuries are secondary to repetitive trauma and associated with long sick leave and therefore lost productivity.^[8] Little is known about lesions and injury patterns associated with the activity of bike riding. A common complaint among motorcyclists is numbness in the fingers innervated by the median nerve, and white fingers after exposure to vibrations caused by the motor, also known as the Raynaud syndrome. Mirbod et al. (1997) recorded overuse syndromes of the upper extremity in 119 police officers who routinely used motorcycles (5.7h/day). These individuals were compared with a control group who were not exposed to vibrations. 4.2% of the officers had Raynaud syndrome with white fingers, while this phenomenon was entirely absent in the control group.^[9] Under normal circumstances, muscles function without pain; however, when subjected to intense or prolonged activity, symptoms relating to muscle fatigue (including pain) can develop. The severity of those symptoms and the time the muscle takes to recover are usually a function of the extent and duration of the activity (with many other complex factors such as fitness and nutrition playing a role). These fatigue and recovery processes reflect physiological phenomena within the muscle and the rest of the body and are elements of a natural cycle.^[10] However, at times and for a wide variety of reasons, a muscle (or its component tendons and other structures) can become damaged in some way. In such cases, using that muscle (or other structures) will provoke symptoms, on a continuum running from minor discomfort to severe pain. These symptoms will occur, regardless of the underlying cause of the damage. One of the basic problems relating to Overuse injuries is that if an individual uses the part of the body that is damaged, then they will, understandably, associate the activity giving rise to the resulting symptoms with the symptoms themselves. This might well be reinforced away from work, where, again understandably, the individual will try to avoid actions that provoke symptoms. Depending on how successful they are, this will lead to the situation that 'when I work it causes me pain, but when I am not at work the pain subsides/goes away'. Almost inevitably, this leads to the conclusion that work is in some way responsible for the underlying damage, which is causing the pain.^[10] However, where damage has occurred, pain and other symptoms might arise when the damaged structures are used. This leads to the next identifiable stage in the continuum, where, in some instances, a work activity might provoke symptoms through 'using' the

affected structures but does not necessarily cause any damage.^[10] When persistent symptoms occur after ruling out more common forearm conditions like tenosynovitis, carpal tunnel syndrome, and epicondylitis, the term WRULD (Work-Related Upper Limb Disorder) is often used. It's basically a diagnosis made by excluding other known causes. Contrary to popular belief, WRULD isn't just a problem of the modern industrial age.^[11,12] Overuse syndromes usually impact the upper body, like the neck, shoulders, elbows, wrists, and hands. The wrist is often affected, with many people experiencing work-related carpal tunnel syndrome. While carpal tunnel syndrome is rare in the general population (less than 1%), it's more common among workers who do tasks that put them at risk (up to 15%).^[13]

Wrist syndromes are the most common upper extremity overuse injuries.^[14] The course and prognosis of overuse syndromes are understood best by reviewing the pathologic stages of the inflammatory response^[13] :

1. The inflammatory stage starts immediately after injury, when vasoactive and chemotactic factors are released. These factors promote vascular ingrowth, increase vascular permeability, and encourage an invasion of inflammatory cells. This stage lasts 48 hours to 2 weeks unless there is further injury, in which case it can be prolonged. The exact site of injury can be masked by inflammation of adjacent tissues. Clinical symptoms include pain, swelling, erythema, warmth, and tenderness.
2. The proliferative phase lasts 1 to 2 weeks and is a time when collagen and ground substances are produced. The area is highly susceptible to injury during this stage. Only a low-level activity is encouraged, and movement should be limited to a pain-free range.
3. During the maturation stage, further healing is completed during 6 to 12 weeks. Full unrestricted activity should be avoided until this process is complete. Flexibility exercises, isometric contractions, and a slow return to resistive exercises are safe so long as pain is not produced. If the athlete or worker pushes too hard or too fast, the inflammatory response is reinitiated. Fibrosis results from continued or repeated release of inflammatory products leading to thick, unyielding, restrictive tendon sheaths or retinacular tunnels. The result of this process, stenosing tenosynovitis, usually requires surgical treatment. Overuse syndrome is a disorder characterized by pain and loss of function in muscle groups and ligaments as a consequence of their overuse.^[15,16] Sometimes, even mild medical issues that might not be obvious during a regular checkup can come together to cause symptoms of a WRULD (Work-Related Upper Limb Disorder). There are eight such possibilities listed in Table 1.^[11]
 - Overuse, common among athletes, can contribute to work-related upper limb disorder symptoms.
 - Micro trauma, small injuries over time, can also be a factor.
 - Physiological overload, like lactic acid build-up, may play a role.
 - Inherited muscle metabolism issues could be a cause.
 - Nerve entrapment, where nerves get stuck, is another factor.
 - Compartment syndrome, when muscles swell and press on nerves and blood vessels, can contribute too.
 - Symptoms are less common in self-employed individuals.
 - May experience extremely localized symptoms, possibly related to cortical issues like focal dystonia.

Overuse syndrome affects various professionals whose hands do repetitive movements, but it can also be caused by other factors, including psychological ones. The lack of agreement worldwide on what overuse syndrome really is and what causes it has made it hard to learn more about it. This confusion has held back progress in understanding the syndrome better.^[17-22]

In a recent study conducted in 2021 by Beibei Feng, Kedi Chen, Xiaoxia Zhu, Wing -Yuk, showed the self reported cases for wrist and hand symptoms and clinically confirmed Carpel Tunnel Syndrome among office workers in China. The study mentioned carpal tunnel syndrome (CTS) is a common cause of pain, numbness and tingling in the wrist and hand region and is associated with repetitive wrist and hand use in office workers. The study concluded intense computer use and no breaks at work are associated with wrist and hand symptoms. The prevalence of wrist and hand symptoms were 22 and 15%, respectively.^[23]

Methods

Research design

This study was epidemiological in nature, with the aim of finding the prevalence of overuse syndrome of wrist in food delivery employees and their associated work risk factors. The study was therefore survey based, observational and quantitative, in the form of a self administered questionnaire and Numerical Pain Rating Scale.

Participants

The research questionnaire was hand delivered to the participants. The informed consent requested the employee's participation as well as explained the purpose and procedure of the study. The benefits of the study, confidentiality and remuneration were addressed. The participants were included according to the inclusion and exclusion criteria. A population of 125 food delivery employees was targeted, out of which 100 food delivery employees willingly filled the questionnaire. Out of 100 food delivery employees, 99 employees fulfilled the inclusion criteria.

Research tool

The questionnaire was self made and used along with the Numerical Pain Rating Scale (NPRS). The questionnaire was modified in order to suit Indian population of food delivery employees and in particular the research objectives. The self made questionnaire was validated from the ethical committee of TMV's Indutai Tilak College of Physiotherapy.

Ethics, consent and permissions

Participants in this study received a consent form which introduced the research project by including the title of the study, the aims of the study and reassuring the participants their information confidentiality as well as of their responses. Consent was given by each participant.

Data collection

The study questionnaire was given to the respective participants in person. Data collection took place between November 2023 and February 2024. The questionnaire contained sections on personal as well as work demographics, with questions pertaining to the overuse syndrome of wrist.

Data analysis

The data was analysed with SPSS version. The results present the descriptive statistics in the form of tabulations, graphs and figures, using qualitative data. A significant data was indicated with " $p < 0.05$ ". Chi-square test was used for data analysis at a significance of 0.05.

Results

One hundred and twenty five population of food delivery employees were targeted for the survey. Out of which 100 willingly participated and completed the questionnaire. A response rate of 80% (100/125) was calculated. One response was not used as the participant fell under the exclusion criteria for the study. Therefore, the final sample size of n =99. The survey shows that many food delivery workers have wrist problems because they work long hours and ride bikes as shown in Table no.1

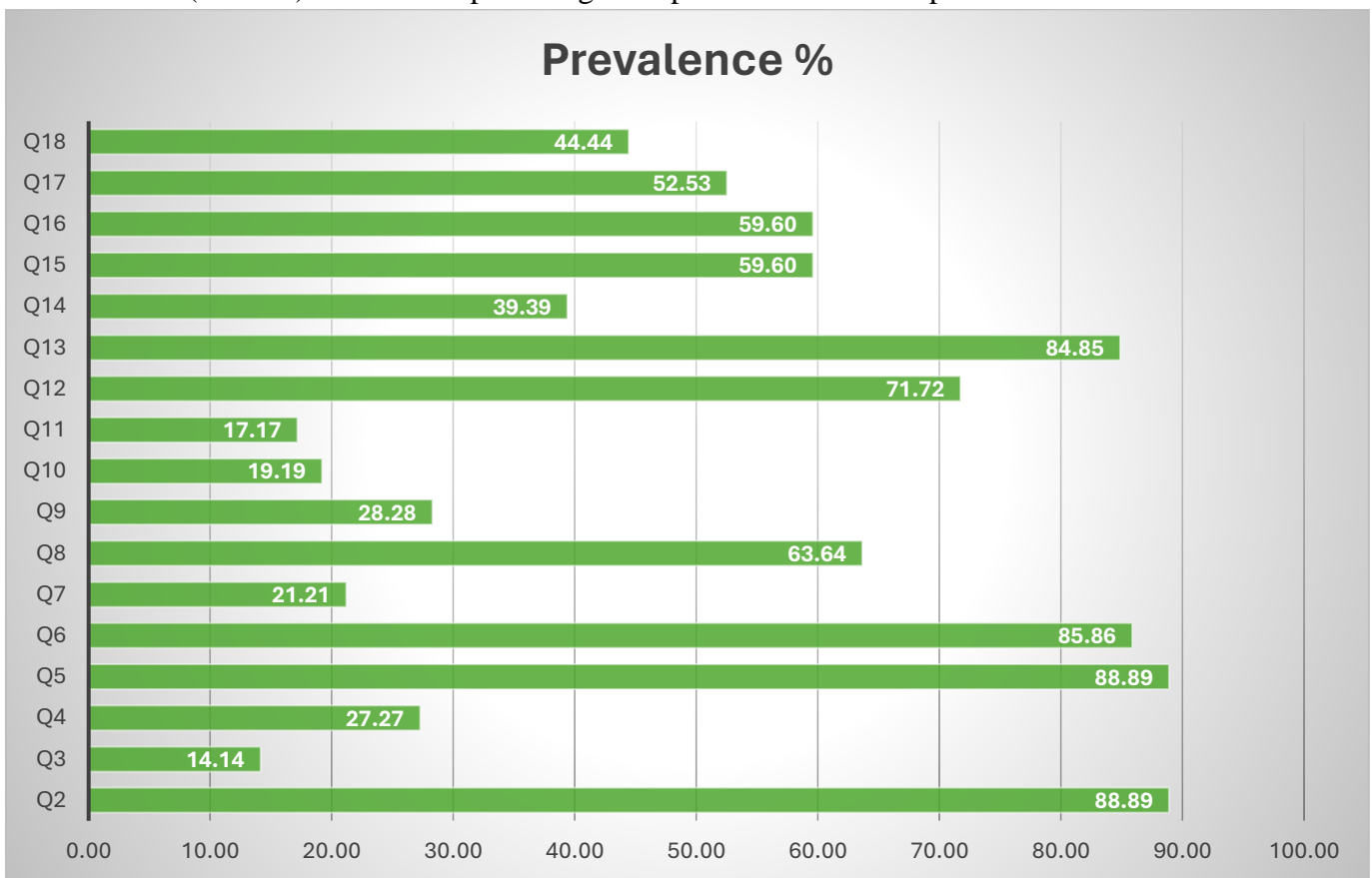
	Yes Outcomes	Considered Subset	Prevalence %
Q.2)Do you work for more time than prescribed working time? (more than 8-9 hours approx)	88	99	88.89
Q.3)Can you remember exactly when your wrist started to hurt?	14	99	14.14
Q.4) Does your wrist hurt when you are not using it or at rest?	27	99	27.27
Q.5) Does it hurt if you use your wrist during bike riding?	88	99	88.89
Q.6)Does the pain get worse if you use your wrist for riding bike?	85	99	85.86
Q.7) Does the wrist hurt if you bend it as far forwards or backwards as possible?	81	99	81.82
Q.8) Do you feel your wrist appears swollen?	21	99	21.21
Q.9)Does your hand feel numb, after riding bike for a long period of time?	63	99	63.64
Q.10) Have you started going for work less because of your wrist problem?	28	99	28.28
Q.11) Do you skip riding bike because of your wrist problem?	19	99	19.19
Q.12)Do objects fall from your hand often?	17	99	17.17
Q.13) When does the wrist pain aggravate (daytime /nighttime)?	71	99	71.72
Q.14) Do you have difficulty in bike riding more than 5 or 10 minutes as a result of your wrist problem?	84	99	84.85
Q.15) Do you use your wrist differently than usual to prevent your wrist from hurting ?	39	99	39.39
Q.16) Does your wrist feel stiff after bike riding?	59	99	59.60

Q.17) Do you feel difficulty in gripping objects (like handle,break)?	52	99	52.53
Q.18) Does the pain radiate in the arm and forearm?	44	99	44.44

Table no.1

Demographics

An overwhelming 88.89% of respondents reported working long hours, while 88.89% experienced wrist pain during bike riding. Additionally, a substantial 81.82% faced difficulties bending their wrists, and 71.72% experienced aggravated pain during the daytime. These figures indicate a widespread issue affecting the majority of workers surveyed. Moreover, significant proportions reported symptoms such as swelling (21.21%), numbness after bike riding (63.64%), and difficulty gripping objects (52.53%), further emphasising the severity of the problem. A significant Pearson correlation was obtained using Numerical pain rating scale for wrist pain on activity of bike riding and on rest ($r = 0.497$), correlation is significant at the 0.01 level (2-tailed). Prevalence percentage is represented in the Graph no.1 below



Graph no.1

Discussion

The study conducted was epidemiological in nature, with the aim of finding out the occurrence of Overuse syndrome of wrist in food delivery employees (bike riders) and associating it with the likely causes and then quantifying the association. The present study was conducted to study the prevalence of Overuse Syndrome of wrist among food delivered employees (bike riders) using a self made questionnaire and

Numerical Pain rating scale (NPRS) .In recent times due to increasing availability from basic household goods to luxury goods on the internet ,there is an increase in delivery services.These services involve employees working for longer periods and delivering goods as per customers need.Due to the need for delivering, these employees indulge into convenient and efficient mode of transportation i.e bikes .But the employees are not aware of the overuse of wrist while riding bikes due to the constant motion of acceleration and braking .^[9]They continue to work for longer period and ride bikes for hours.Lack of this awareness and the occupational factors affecting the wrist are leading to overuse injuries of hand and wrist commonly in bike riders.In the present study,100 delivery employees were questioned according to the inclusive and exclusive criteria ,out of which 99 employees were included between the age group 25-35 years. The observational study was done to find prevalence of overuse syndrome of wrist.

Overuse syndrome, also known as repetitive strain injury is a vague term.It refers to range of painful conditions that occur when repetitive motions put stress on a particular part of the body, often leading to inflammation, tissue damage and discomfort.It commonly affects the wrists ,hands, elbows, shoulders, neck and back.These overuse injuries are secondary to repetitive hand intensive movements in combination with occupational and non occupational risk factors.Symptoms usually include pain , stiffness, loss of control and weakness in the affected area.^[1]

"The upper extremity is most vulnerable to WRMSKI (Work related musculoskeletal injuries) especially the hand/ wrist.Hand/ wrist injuries could be ascribed to repetitive movements . Placing the wrist in either flexion, extension, radial or ulnar deviation was found to be a risk factor for developing WRMSKI, this possibly coupled with incorrect placement or inflexibility of the wrist , could further cause biomechanical strain on the joints and soft tissue of the hand and wrist.^[2]Bike riding requires the wrist to be placed in a combination of the above mentioned positions which predisposes the hand and wrist to injury.^[3]

A study on "The Enduro motorcyclist's wrist and other overuse injuries in competitive Enduro motorcyclists: a prospective study" by M. Sabeti-Aschraf, M. Serek, T. Pachtner, K. Auner, M. Machinek, M. Geisler, A. Goll suggested pain in the upper extremity after competitive Enduro motorcycling is directly related to the overuse syndrome. Based on these findings, a further study was initiated to define the syndrome or the disease causing pain at the upper extremity. It became evident during the examinations, especially during the clinical tests at the finishing line, that most riders who had symptoms at the wrist and forearm also had paresthetic sensations in the hand. Nearly 50% of all the riders complained of pain or paresthetic sensations.^[9]

The study on epidemiology of work related musculoskeletal injuries among chiropractors in eThekweni municipality (2019)) stated that the hand/wrist was the most common anatomical site of injury (31.5%).Hand / wrist injuries being ascribed to the technique used while manipulating patients.Placing the wrist in either flexion, extension, radial or ulnar deviation was found to be a risk factor for developing Work Related Musculoskeletal Injuries(WRMSKI).^[2]

There are various studies done that evidently shows the high incidence of musculoskeletal injuries among several groups of populations due to repetitive motions or prolonged stress on the wrist and surrounding structures for example : Office workers(continuous typing on the keyboard with poor wrist posture),Gamers,Musicians,Sports (heavy lifting, tennis, golf),Manual labour (Plumbing, carpentry, construction work),prolonged bike riding and cycling.^[5]

Overuse of wrist can be predominantly be seen in bike riders, especially those who engage in long distance cycling or frequent biking activities.There are several factors such as prolonged pressure i.e resting the majority of body weight on the handlebars for extended periods can compress the nerves and blood vessels

in the wrist, repetitive motion (continuous gripping and rotating of the handlebars during uphill climb or rough terrain), Vibrations (transmitted through bike's frame and handlebar to the hand and wrist, poor ergonomics (improper bike setup ,improper saddle height , handlebar position or grip size).^[9]

In this present study ,125 population of food delivery employees were targeted for the survey. Out of which 100 willingly participated and completed the questionnaire. A response rate of 80% (100/125) was calculated. One response was not used as the participant fell under the exclusion criteria for the study. Therefore, the final sample size of n =99. The survey shows that many food delivery workers have wrist problems because they work long hours and ride bikes.

The results deduced were 88.89% of respondents reported working long hours, while 88.89% experienced wrist pain during bike riding. Additionally, a substantial 81.82% faced difficulties bending their wrists, and 71.72% experienced aggravated pain during the daytime. These figures indicate a widespread issue affecting the majority of workers surveyed. Moreover, significant proportions reported symptoms such as swelling (21.21%), numbness after bike riding (63.64%), and difficulty gripping objects (52.53%), further emphasising the severity of the problem.

Due to lack of awareness and knowledge, delivery employees continue to put stress over wrist leading to overuse injuries. This in turn increases the risk of injuries and affects their occupational demands.

With proper awareness of signs and symptoms along with possible risk factors that keeps their preventive measures in check, the risk of injuries can be lowered.

In order to reduce the risk of injuries in susceptible population of delivery employees,it is important to create awareness among them about proper signs and symptoms with risk factors that includes pathophysiology causing injury ,occupational factors, activities leading to the injury .More study is needed to determine proper protocols in order to ensure the prevention of common injuries among delivery employees .

Limitations

The study may be limited by sampling bias this means that in the study, some types of food delivery workers might be included more than others, or some might not be included much at all.

The study can also deal with self reporting bias which means that sometimes people might not tell the truth about how they're feeling or if they're having any problems. For example, some delivery workers might not mention if their wrist hurts because they're worried it could affect their job, while others might exaggerate their symptoms to get more attention or compensation.

There is limited access to data . Researchers might find it hard to get all the information they need about food delivery workers. This study focuses on male food delivery employees excluding the female population.

Wrist problems from overuse might not be recognised or labeled correctly, especially in places where workers can't easily see a doctor or get tests done to find out what's wrong. Because of this, we might not realise how many people actually have these wrist problems, and it can make it harder to figure out how to stop them from happening in the first place.

Conclusion

The study concludes that the prevalence of overuse syndrome of the wrist among food delivery employees is a significant concern. The repetitive nature of work, involving gripping and constant bike riding, contributes to the development of various wrist related issues .Employers should prioritise ergonomic

interventions, regular breaks and education on proper wrist care to mitigate the impact of overuse syndrome and promote the long term health and well being of their employees.

Acknowledgements

We would like to thank the food delivery employees who participated in the study.

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