

Study Of Prevalence Of Chondromalacia Patella In Long Route Bus Drivers.

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ABSTRACT

Introduction:Chondromalacia patella is characterized by the softening or damage to the patellar under surface is a common condition associated with knee pain and dysfunction.Long route bus drivers ,who are required to sit with knee flexed for prolong time and frequently use their legs for operating the vehicle,including pressing the clutch and break pedals,which may contribute to mechanical stress on knee joint.Due to prolonged,repertitive nature of these action,so drivers are at increased risk for developing musculoskeletal disorder including Chondromalacia patella.

Methodology: A observational study conducted with 97 participants aged between 25 to 45 Each participant had taken part in a single test of Clarke's sign, Kujala score questionnaire and NPRS Scale. For assessing knee functions Kujala score questionnaire was performed. All the outcome measures were assessed on same day for each participants by the same examiner.

Result: The result of the study was generated using SPSS version 28 MS Excel 2016. This study shows that In NPRS, pain ratings are significantly higher during movements of activity (8.06) compared to at rest (3.52). By Kujala score questionnaire we got to know that 21% of patients experienced severe Anterior knee pain, 55% of patients (good + fair) experienced mild to moderate knee pain and 27% of patients experienced minimal or no pain.

Conclusion: The results of this study provide valuable insights into the pain and experiences of patients with anterior knee pain. Notably, This finding highlights the impact of physical activity on exacerbating anterior knee pain, emphasizing the need for effective management strategies to mitigate this pain during daily activities.Furthermore, the Kujala score questionnaire revealed that findings underscore the heterogeneity of pain experiences among patients with anterior knee pain, emphasizing the importance of personalized treatment approaches that cater to the unique needs and pain profiles of individual patients. Overall, this study contributes to a deeper understanding of anterior knee pain and informs the development of effective management strategies to improve patient outcomes.

Keywords: : Anterior Knee Pain, NPRS (Numerical Pain Rating Scale), Kujala score questionnaire, Physical Activity

1. INTRODUCTION

The softening, thinning and degeneration of the cartilage beneath the patella is known as chondromalacia patella. which affects patients of all ages. Is another condition that characterize it. The main Cause of the illness in teenagers and young adults is trauma that breaks down intraarticular Cartilage and Causes osteoarthritis.¹

The trochlea of the femur and the patella made up the patellofemoral joint. Is crucial for knee extension and deceleration by acting as lever inside the leg, the patella reduces the force needed by quadriceps to extend the leg at knee. The quadriceps patellar tendon,vastus medialis obliquus,medial retinaculum,medial patellofemoral ligament and medial patellotibial ligament

all maintain the patellofemoral joint.

The angle known as the Q angle which forms from the anterior superior iliac spine to the patella centre to the tibial tubercle, is used to calculate the force of the quadriceps for men the Q angle is 14 degrees and for women it is 17 degrees.²

The anatomy of knee joint, the knee is the largest and most visible joint classified as a hinge joint. It consists of two articulations:

The tibiofemoral articulation is created by the articulation of the femoral and tibial condyles.

The patellofemoral articulation with the patellar surface of the femur. The knee joint capsule is made up of a thin fibrous membrane on the outside and a synovial membrane on the inside, which lines all interior surface not covered with articular cartilage and contains synovial fluid. The fibrous layer connects superiorly to the articular borders of the femoral condyles and inferiorly to the tibial plateau margins. It is continuous medially and laterally with the quadriceps tendon, patella and patellar ligament. The synovial membrane is attached to the articular cartilage periphery, which includes the femoral and tibial condyles, the patella's posterior side and meniscus borders. The synovial membrane extends anteriorly from the joint's posterior side, covering the cruciate ligament and the infrapatellar fat pad, preventing them from entering the articular cavity. The medial and lateral patellar retinacula are made up of extension from the vasti and fascia lata, as well as iliotibial band. Posteriorly, the capsule consists of vertical fibres coming from the lateral condyles and the intercondylar fossa of the femur. Thus placed on the sides and in front of the cruciate ligaments. The knee is a mechanically weak joint due to the incongruity of its articular surfaces. As a result, knee stability is determined by the strength and tendons of the surrounding muscles, as well as the ligaments that connect the femur to the tibia. The most stable posture for the knee is extended with the foot on the ground. In this posture, the articular surfaces are most stabilized and the collateral and cruciate ligaments as well as the surrounding muscle tendons are most taut. The ligaments of the knee joint are divided into extra patellar and intrapatellar. The extra patellar ligament which is located on the anterior side of patella. The intrapatellar ligament is placed in the center of the joint capsule crossing each other obliquely, but remaining outside the synovial cavity. They limit tibial rotation against the femur beyond 10°.

The patellofemoral joint: The patella is the largest sesamoid bone found in the human body. It is flat and triangular in shape, situated within the patellar ligament and articulating with the femur to form the patellofemoral joint. The function of patella is to preserve the anterior section of the joint while also the mechanical advantage of the quadriceps muscle by giving extra leverage, as it positions the quadriceps femoris tendon more anterior. The quadriceps femoris tendon expands to cover the patella's convex anterior surface and it continues with fibres from the patellar ligament. The bursa separates it from the skin. The posterior surface is separated into five facets, which correspond to the articulating surface with femur. The shape of five aspects superior, inferior, medial, lateral, and odd differs between individuals and may impact patellar tracking. The superior border attaches the rectus femoris and vastus intermedius, whereas the medial and lateral borders attach the vastus medialis and vastus lateralis respectively. The apex is oriented downwards and provides attachment to the patellar ligament. Under the retinaculum, there are three ligaments: patellofemoral, patellatibial and patellomeniscal. The patellofemoral ligament is the principal constraint on patellar lateral translation while the patellomeniscal and patellotibial ligaments are less important functionally.³

In signs and symptoms of Chondromalacia patella, acute or chronic discomfort is one of the signs of Chondromalacia patella; cracking and popping sounds are another. Running, crouching, squatting, climbing stairs and other knee-related physical activities exacerbate these symptoms. Usually, Chondromalacia patella symptoms get worse with time. Chondromalacia patella manifests as a vague soreness in the inner front of the knee that gets worse when you run, jump, climb or descend stairs, or when you sit for a long time with your knees slightly bent. Additionally, some individuals may experience a tightness or fullness in the knee.^{4,5}

The causes of Chondromalacia patella are running, soccer, cycling, and gymnastics are high impact sports that include sudden stops and repetitive torsion, stress and torque on the joint. Participating in these activities can cause Chondromalacia patella in teenagers and young adults. Under the knee cap, intra-articular cartilage might deteriorate due to overuse or injury. Ligament damage, excessive laxity, joint hypermobility and clinical instability associated with osteoarthritis can all lead to the condition which manifests in the synovial joint. Congenital flat feet and injuries from auto accidents (fractures and dislocations) are two causes of Chondromalacia patella in teenagers and young adults. When moving the knee cap may dislocate to one side or fail to fit correctly into the femoral groove.¹

Long route bus drivers are often subjected to prolonged hours of sitting, which can place significant strain on the knee joints. Despite the sedentary nature of driving, the act of controlling the pedals and maintaining certain postures for extended periods can contribute to the development of musculoskeletal conditions, including Chondromalacia patella. The repetitive movements involved in pressing the accelerator, brake, and clutch pedals, combined with the constant flexion and extension of the knees, can lead to the degradation of the cartilage under the patella.⁹

Chondromalacia patella among long route bus drivers is becoming a recognized concern, as the unique combination of occupational factors and prolonged periods of seated posture leads to an increased risk. Several factors contribute to the onset

of Chondromalacia patella in bus drivers:

Repetitive Knee Motion such as those required to operate the pedals, repetitive bending, flexing, and straightening motion over the course of hours can lead to wear and tear on the cartilage of the patella.

Sitting for long periods without adequate movement or stretching can lead to stiff and weakened muscles around the knee joint. The lack of dynamic movement can reduce blood circulation to the knee, further increasing the likelihood of cartilage deterioration.

Many bus drivers tend to sit with poor posture, either by slouching or maintaining a fixed position. This improper alignment places additional strain on the knees and surrounding tissues, heightening the risk of cartilage damage over time.

The vibrations from the bus while driving for long periods may also contribute to wear on the knee joints. Constant exposure to vibrations may exacerbate the stress on the cartilage, increasing the risk of Chondromalacia.

As with many musculoskeletal conditions, the risk of Chondromalacia increases with age. Overweight individuals are also more likely to experience knee problems due to the additional load placed on the knee joints^{6,7,8}

Higher prevalence is found in long route bus drivers due to prolonged sitting with knee flexed for longer than continue 4 hours per day.

About 50% of people develop patellar tendinopathy at the age of 30yrs. The first change that is apparent to the unaided eye is a little nodular enlargement of the cartilage. This typically occurs on the medial side of patella's center. The knee is frequently significantly enlarged with fluid and the synovial has thickened.

The degree of advancement of the degradation in the patella's articular cartilage is reflected in some variation in the symptoms and clinical indicators. In both sexes they start to happen more frequently around the age of 15yrs.¹⁰

2. METHODOLOGY

An observational cross-sectional study was done on Long route bus drivers using Convenience sampling method for a duration of one year with a sample size of 97. Study subjects were selected according to inclusion and exclusion criteria.

Materials: Clarke's sign, Kujala score questionnaire, NPRS Scale.

Inclusion criteria: Long route male bus drivers in age group of 25-45yrs, Patient complaining of anterior knee pain, Subject willing to participate in the study.

Exclusion criteria: Cases of trauma, fracture, surgery in and around knee joint, Cases of Rheumatoid arthritis and Osteoarthritis.

3. PROCEDURE

Study was started after approval from institutional ethics committee of D.Y. Education Society, Kolhapur. An observational study which was performed in 97 participants. It is prevalence study performed in 97 drivers, they were approached and were explained about the whole research. A written consent form was taken from the participants who were willing to participate in the study. The participants were included on the basis of the inclusion and exclusion criteria. Data collection sheet including their personal details, and study related measures were taken from the participants also the sheet involved about the interpretation of the scales taken.

For assessment Clarke's sign, Kujala score questionnaire and NPRS scale were also administered.

After the collection of the whole sample size the master chart containing all the information of data sheet was formed and then the final result was obtained through the statistical analysis.

4. RESULTS

The total number of 97 bus drivers with Chondromalacia patella age between 25-45 years was included in this study.

Descriptive statistics was used to find out the frequency percentage mean and SD from demographic data and variable studies.

Table no 1- Descriptive statistics representation the Age (In Years), Years of driving, Driving duration (In Hrs/min), Break time in between driving (In min) of bus drivers:

Variable	Mean	S.D.
Age(Yrs)	36.31	5.57
Years of Driving	8.99	4.41

Driving Duration(Hrs/Min)	6.86	1.35
Break Time in between Driving(min)	18.87	6.94
Kujala Score	64.13	20.26

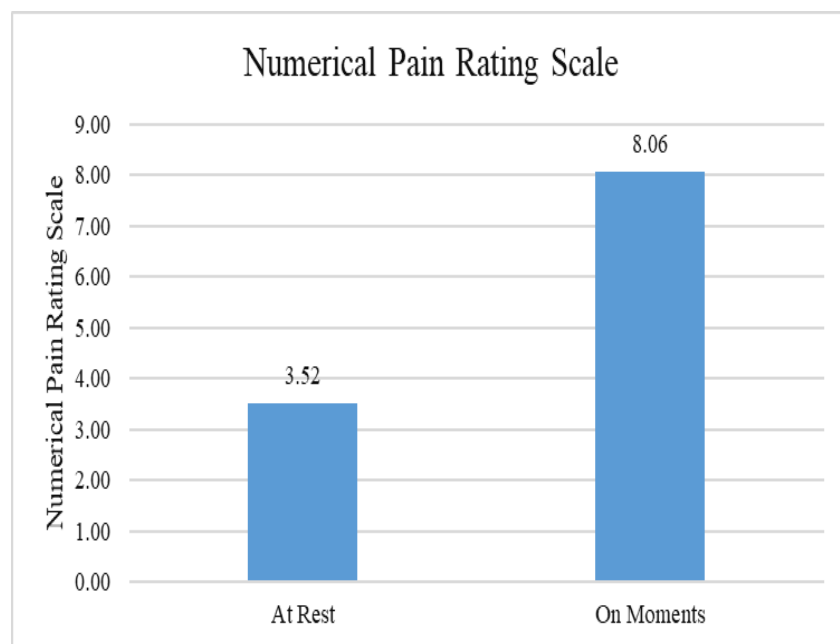
A descriptive statistics of age in Years. Among 97 participants considered for study, the, mean age (in years) of the participants is 36.31 years with SD 5.57Years.

A Years of Driving participants have been driving for about 9 years, mean is 8.99 years with a SD 4.41 years. A Driving Duration mean is 6 hours 86 minutes with a SD of 1 hour and 35 minutes.

A Break Time Participants Mean is 19 minutes, with a SD of 6 minutes and 56 seconds.

A Kujala Score. The Mean Kujala score is approximately 64, with a SD of 20.26. This score suggests a moderate level of knee pain.

Graph no 1- Graphical representation on NPRS distribution among bus drivers:

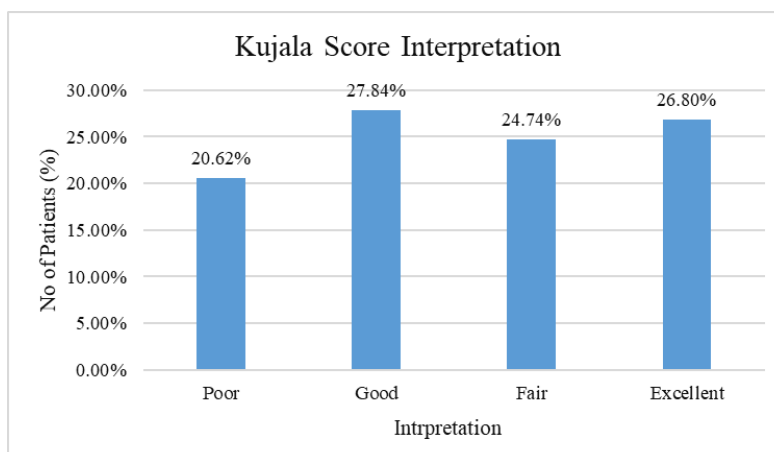


At Rest Average Mean is 3.52 (S.D. 1.56), with a highly significant P-value (8.74E-55), indicating a very low probability of observing this result.

Table no 2 Descriptive statistics on NPRS of bus drivers in the study:

Numerical Pain Rating Scale	Mean	S.D.	P-value
At Rest	3.52	1.56	8.74E-55
On Movements	8.06	1.22	

On Movements Average Mean is 8.06 (S.D. 1.22), with a highly significant P-value.

Graph no 2 Graphical representation on Kujala score questionnaire among bus drivers:

The distribution of Kujala scores among 97 drivers, categorized into four levels:

Poor: 20 patients (20.62%) had poor Kujala scores, indicating severe knee pain.

Good: 27 patients (27.84%) had good Kujala scores, indicating mild knee pain.

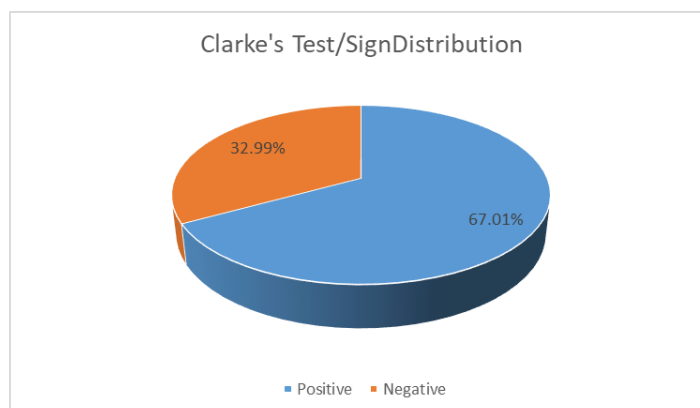
Descriptive statistics on Kujala score questionnaire of bus drivers in the study:

Kujala Score	No of Patients	Percentage
Poor	20	20.62%
Good	27	27.84%
Fair	24	24.74%
Excellent	26	26.80%
Total	97	100.00%

-Fair: 24 drivers (24.74%) had fair Kujala scores, indicating moderate knee pain.

- Excellent: 26 drivers (26.80%) had excellent Kujala scores, indicating minimal or no knee pain. These results suggest that.

Graphical representation on Clarke's sign among bus drivers:



the results of Clarke's sign in 97 bus drivers-

Positive: 65 patients (67.01%) tested positive for Clarke's sign, suggesting that in 97 drivers 65 drivers have knee pain.

Negative: 32 patients (32.99%) tested negative for Clarke's sign, indicating that no knee pain in 32 drivers.

Descriptive statistics on Clarke's sign of bus drivers in the study:

Clarke's Sign	No of Patients	Percentage
Positive	65	67.01%
Negative	32	32.99%
Total	97	100.00%

5. DISCUSSION

Chondromalacia patella is a common condition that affects individuals of all ages and occupations. However, certain occupations, such as bus driving, may be associated with a higher risk of developing anterior knee pain due to the physical demands of the job. Long route bus drivers, in particular, may be at risk due to prolonged periods of sitting, driving. This study aimed to investigate the pain experiences of long route bus drivers with anterior knee pain, and to identify factors that contribute to the development and management of this condition. The results of this study highlight the significance of anterior knee pain among long route bus drivers. In this study total 97 participant's are participated. The Numerical Pain Rating Scale (NPRS) revealed that pain ratings were significantly higher during movements of activity (8.06) compared to at rest (3.52). This finding suggests that physical activity exacerbates anterior knee pain in this population.

The Kujala score questionnaire revealed that 21% of patients experienced severe anterior knee pain, 55% experienced mild to moderate knee pain, and 27% experienced minimal or no pain. These findings underscore the heterogeneity of pain experiences among patients with anterior knee pain, emphasizing the importance of personalized treatment approaches.

The high prevalence of anterior knee pain among long route bus drivers may be attributed to the nature of their job, which involves prolonged periods of sitting, driving, and physical activity. The repetitive strain on the knee joint, combined with poor posture, inadequate seat design, and insufficient break times, may contribute to the development of anterior knee pain.

The results of this study are consistent with previous research, which has shown that individuals who engage in repetitive knee-bending activities, such as bus drivers, are at increased risk of developing knee pain and osteoarthritis. The findings of this study highlight the need for targeted interventions to prevent and manage anterior knee pain in this population.

The identification of risk factors for anterior knee pain is crucial for the development of effective prevention and management strategies. In this study, the results suggest that physical activity is a significant exacerbating factor for anterior knee pain. Therefore, strategies that reduce the physical demands of driving, such as regular break times and ergonomic adjustments to the driving environment, may be beneficial.

Furthermore, the findings of this study emphasize the importance of personalized treatment approaches for anterior knee pain. The Kujala score questionnaire revealed significant variability in pain experiences among patients, highlighting the need for tailored interventions that address individual needs and pain profiles.

The results of this study also have implications for the general population. Chondromalacia patella is a common condition that affects individuals of all ages and occupations. The findings of this study highlight the importance of physical activity and ergonomic factors in the development and management of anterior knee pain, and may inform the development of prevention and management strategies for this condition in the general population.

The limited break times afforded to bus drivers can also restrict their ability to stretch, move around, and rest their knees. This can increase the risk of developing chondromalacia patella, as the knee joint is not given adequate time to rest and recover.

The findings of this study have important implications for the prevention and management of Chondromalacia patella in long route bus drivers. Employers and policymakers can take steps to reduce the risk of Chondromalacia patella by providing regular break times, promoting stretching and exercise, and modifying bus seats to reduce pressure on the knee joint.

Ergonomic modifications, such as adjusting the seat height and angle, can also help to reduce the risk of Chondromalacia patella. Additionally, providing anti-vibration seats and floor mats can help to reduce the transmission of whole-body vibration to the knee joint.

Exercise and stretching programs can also help to reduce the risk of Chondromalacia patella. Strengthening the muscles

around the knee joint, such as the quadriceps and hamstrings, can help to provide stability and support to the joint. Additionally, stretching exercises can help to improve flexibility and range of motion.

Education and awareness programs can also help to reduce the risk of Chondromalacia patella. Educating bus drivers about the risks of Chondromalacia patella and providing them with information on prevention and management strategies can help to empower them to take control of their health.

The sample size was relatively small, and the study was conducted in a specific region. Further research is needed to confirm the findings of this study and to explore the risk factors and consequences of Chondromalacia patella in long route bus drivers.

Future research directions could include investigating the effectiveness of ergonomic modifications, exercise and stretching programs, and education and awareness programs in reducing the risk of Chondromalacia patella in long route bus drivers. Additionally, further research is needed to explore the consequences of Chondromalacia patella, such as absenteeism, presenteeism, and quality of life.

So, the finding of this study suggest that there is high risk of Chondromalacia patella among long route bus drivers, there is a lack of research on the prevalence, risk factors, and consequences of this condition in this population. This study aims to address this research gap. The results of this study provide valuable insights into the pain experiences of long route bus drivers with Chondromalacia patella. The findings highlight the significance of physical activity and ergonomic factors in the development and management of Chondromalacia patella, and emphasize the importance of personalized treatment approaches and targeted interventions to prevent and manage this condition.

6. CONCLUSION

Effective management strategies, such as regular exercise, physical therapy, and ergonomic adjustments to the driving environment, may help to mitigate the pain and discomfort associated with anterior knee pain. Furthermore, this study highlights the need for employers and policymakers to take proactive steps to prevent and manage musculoskeletal disorders, such as anterior knee pain, in the workplace. This may involve providing education and training on proper driving techniques, ergonomic adjustments, and stress management, as well as implementing policies and procedures to support the health and well-being of employees.

Overall, this study provides a foundation for future research on the prevention and management of anterior knee pain in long route bus drivers. Further studies are needed to investigate the effectiveness of different management strategies and to explore the relationship between anterior knee pain and other musculoskeletal disorders in this population

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