Prevalence of backache among bus drivers

&

associated modifiable risk factors

in Latur, Maharashtra

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Dissertation submitted in partial fulfilment of the requirements for

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Dedication

This work is dedicated to my grandmother Mrs. Trivenibai Dhage who has seen nothing but the pain in her whole life but tried to keep me smiling always and to my sister Dr. Shilpa Bhakre who is inspiration for the lifetime.

CERTIFICATE

I hereby certify that the work embodied in this dissertation titled "Prevalence of backache among bus drivers & associated modifiable risk factors in Latur, Maharashtra" is a bona fide record of original research work undertaken by Dr. Abhijeet V. Jadhav in partial fulfilment of the requirements for the award of the degree of 'Master of Public Health', under my guidance and supervision.

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DECLARATION

I hereby declare that the work embodied in this dissertation work titled "Prevalence of backache among bus drivers & associated modifiable risk factors in Latur, Maharashtra" is the result of original research of mine and has not been submitted for any degree in any other institution or university.

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BLS: Bureau of Labour Statistics

HCF: Health Care Facility

HMV: heavy motor vehicle

HRQOL: Health Related Quality Of Life

ICD: International Classification of Diseases

ILO: International Labour Organization

IVD: Intervertebral Disc

LBP: Low Back pain

MARTC: Maharashtra State Road Transport Corporation

MRI: Magnetic Resonance Imaging

NHA: National Health Accounts

NIOSH National Institute of Occupational Safety and Health

OECD: Organization for Economic Cooperation and Development

PAPR: Peak-to-Average Power Ratio

RMS: Root Mean Square

WBV: Whole Body Vibration

WHO: World health organization

ABSTRACT

- **Background:-** Low back pain is a very common symptom affecting quality of life at individual level, burdening on health care system & causing economical losses to industry. This public health problem is very much neglected in developing countries. Magnitude of this problem is suspected to be high in some of the occupations like driving.

- **Methodology: -** A cross sectional study using self-administered questionnaire in two groups of drivers (n=178) & non-drivers (n=184), which were selected from same bus depot for comparison in prevalence of low back pain (LBP) and factors associated with it, in Latur, Maharashtra.

- **Results:** - Mean ages of two groups were comparable. The 10 years' percentage prevalence of LBP was found to be 70.8 & 51.6 among drivers & non-drivers respectively whereas point prevalence in the same was found to be 64.0 & 44.6. The prevalence of LBP was higher among drivers OR- 2.270 (1.471- 3.502) as compared to non-drivers. Risk factors like prolong sitting in one posture, night shifts, job non-satisfaction, tobacco use and lack of exercise are significantly higher in drivers. Also it was found that uncomfortable feeling at the start of work OR=2.171 (1.142-4.125) and uncomfortable feeling at the end of work OR= 2.228 (1.294-3.836) associated with low back pain (LBP).

  Though the prevalence & intensity of LBP is higher among drivers their number of leaves & hospital admitted days are less compared to non-drivers.

- **Conclusion:** - The prevalence of chronic low back pain was significantly higher among the bus drivers, indicating association between driving occupation and back pain. Prevalence of neck pain and most of the suspected risk factors was also high among drivers compared to non-drivers. But this study failed to prove association between those risk factors & LBP. Drivers were seeking health care for LBP but they got less time for recovery.

Chapter: 1

Introduction

WHO explains the symptom of low back pain as pain felt in the loin (ICD-10. M54.5).[1]This is one of the most common complaint and has the highest prevalence in all symptoms both at individual as well at outpatient department level.[2, 3, 4] Back pain is highly associated with disability and it has high burden on medical system.[5, 6] But there are very few studies in India which explore this important issue.

1.1 Backache:-

History traces the first medical record keeping to the era of pyramid construction in Egypt and it was that of backache, the most common occupational health problem.[7]

Backache is a vague terminology commonly understood as pain in back or in the region of spine.[8, 9] In a WHO study back pain was the top most in the list of anatomical site wise pain.[2]Unfortunatly it is often neglected at individual as well at community level; mainly because of its non-fatal and benign nature.[10] This is the reason why people as well as physicians tend to neglect it. But this problem has a huge impact on quality of life of the individuals.[11, 12] Chronic back pain if neglected may lead to disability or other sever medical conditions.[13, 14] Diagnosis of the cause of backache is not always easy. This is mainly because backache is a symptom not a sign, which means it is a subjective feeling and cannot be validated by external examination or tests.[10, 14] It is of various intensities, types and locations with diverse number of causes and many of times even without a cause. There are studies which show that many times the radiologically positive people are symptom free and sometimes patients with backache are without any radiological findings.[14 to 17]

Backache or back pain is classified commonly based on anatomical site or based on aetiology.

Anatomical classification is based on in which region pain exists i.e. cervical, thoracic, lumbar, sacro-coccygeal . Usually lumbar and sacro-coccygeal area is considered as lower part of back and hence pain in this area is called as low back pain (LBP).[18]Also low back pain is the most common type among back pain.[19]Hence more emphasis has been given on low back pain (LBP) in this study.

Aetiological classification is primary and secondary low back pain. Primary is the type where there is no any obvious cause or pathology for pain. It is the most common type of back pain, constitutes about 85 to 90 % of back pain cases.[19]It is also known as mechanical pain. Secondary low back pain is the pain due to some underlying pathology. It is also known as pathological pain.[18 to 20]Low Back pain is also classified based on duration as acute (less than 4 weeks), sub-acute (4 weeks to 12 weeks) and chronic (more than 3 months).[21 to 23]

Main cause of worry is its increasing magnitude not only in working population but also in all other age groups. It is also indicate that low back pain has a relatively increasing prevalence during school years.[24] The prevalence in paediatric age group varies from 12% to as high as 51%.[14] A study showed the prevalence of low back pain (LBP) in adolescent age group was 30%, and 8% of them needed medical treatment.[17] In 2002 alone, approximately 1.4 million children or youths in Germany were diagnosed with backache.[25]Other factors like occupation may add burden of this problem on society. To complicate the issue genetics related studies have shown that there are genetic markers and different genetic risk factors for backache and every individual behaves to the external risk factors differently.[26] Genetic causes are also playing the role in LBP as well

as other spinal diseases with more risk to the child if parents are suffering from LBP.[17]So it needs a deeper understanding of this problem which is only possible through multidisciplinary approach.

1.2 Backache as a public health problem

It was evident in a recent survey by the Health and Safety Executive (2005), back pain is the leading cause of disability, in USA causing 1.1 million people disabled (Labour Force Survey, 1998).[27]So far it is not clear that whether we can prevent back pain through public health interventions or not but there are strong evidences that we can prevent the consequences of back pain.[28]

Back pain affects 80% of the population at some time, in some form in their whole life and is one of the most frequent reasons both for consulting a primary care physician and for taking leaves.[3] lifetime prevalence of low back pain (LBP) is found to be nearly 54% [29] to 80%[4] depending upon various studies in developed countries. The point prevalence of chronic LBP was 15%.[10]

A study shows the median duration of the low back pain (LBP) episode was 8 days and 87% of patients had recovered by 30 day, 5 to10% developed chronic LBP.[3] Another study says, 28% experience disabling low back pain at sometime during their lives and 8% of the entire working population will be disabled in any given year.[14]

There exists a vicious cycle of LBP badly affecting HRQOL (health related quality of life) and low HRQOL worsening LBP.[3] Same is true with depression and anxiety which are caused by back pain and there is less recovery in depressed patients. Also it is evident that certain psychological symptoms are more in chronic LBP.[30, 31] Backache is the problem which has not only the physical symptoms but also the psychological effects.[15, 32]

Constant bodily pain leads to depression which in turn aggravates the psycho-somatic symptoms.[33] This is more pronounced in backache with restricted mobility.[15] A WHO study showed that patients with chronic pain were 4-5 times more likely to have anxiety or depressive disorders and low back pain stood top in the list of chronic pains.[2]

A longitudinal study in nurses showed the 8 years LBP prevalence was 73-76% and 19% of the total sample showed increasing backache.[34] A study shows that there is significant association between the occupational risk factors and radiological evidence of degenerative changes in the spine on MRI.[16] It signifies that there are some professions in which there could be high burden of this health problem.

According to Organization for Economic Cooperation and Development (OECD), this portion highly varies depending upon state disability policy or compensation policy.[35] There are many factors which affect the prognosis of back pain. They are patient related, work-place related and Worker's Compensation policy related. Just clinical improvements are not enough.[36] Understanding of these categories of factors and their proper modification even at work place, is of paramount importance to avoid the morbidity and its associated cost. Some work related psychological stress factors also affect the occurrence and recovery of the backache and the related problems.[27, 32]

It’s unjust to poses known or unknown health risks to a person who is struggling at the employment place for the betterment of his family. Since a huge portion of population falls under the category of working group, studying their health related issues forms a major component of public health. Unfortunately the occupational health and its related issues are not much stressed in public health.

1.3 Back pain as an occupational health

The Joint ILO, WHO Committee on Occupational Health defines Occupational health as "the promotion and maintenance of the highest degree of physical, mental and social well-being of workers in all occupations".[37] protection of worker from all risks is the main issue they identified.

To identify these risks and to mitigate such problems, epidemiology can provide some fine tools.[14] Epidemiological studies are used as the gold standard in occupational and environmental health, but for understanding of such problems it needs a multi disciplinary approach.[38]

WHO report on global health risks 37% of back pain is attributed to the occupational risk factors.[39] There are so many hazardous occupations posing numerous types of risks to the workers. Due to non-uniformity of job nature, risks and protective factors it is very difficult to identify the exact cause of the adverse health outcome.[40] As per the survey by Bureau of Labour Statistics (BLS) of the U.S. Department of Labour, in various categories of work related illness, back pain constitutes 52 to 65 % of the burden.[4] The disability related to backache is showing increasing trend in working population recently in UK.[41]

It is considered that 'returned to work' after sick-leave due to back pain is the recovery point by many researchers. But actually a considerable portion of this group continues to be a backache sufferer.[35, 42] Though patients return to their jobs they continue to suffer from low back pain, but many studies fail to understand that they are still suffering.[42] The recurrence rate is likely to be high in such patients, but very few studies have looked into

it. Multiple studies in the late 90s showed recurrent or chronic low back pain, evaluated at 3 months, 6 months, or 12 months, ranging from 35% to 79%.[14]

So this study focuses on the issues of Low Back Pain (LBP) which affects comparatively larger portion of working population and issues which poses the highest burden economically. It is recognized since 1960 in developed countries, that it has huge cost burden as well.[43]

1.4 Economical burden

It is important to look into the matter of economical loss and impact due to low back pain. This can be an argument addition to the human rights (health) perspective to focus on this problem especially in the developing country like India.

In Netherlands, expenditure on backache problems found to be 1.7% of the GNP, the fifth most expensive disease, and the most expensive regarding work absenteeism and disablement with direct medical costs nearly US$200 million, which is calculated to be just 7% of the total cost. The gross split of the indirect cost US$4.6 billion is -US$3.1 billion was due to absenteeism and US$1.5 billion to disablement.[29] Similar data from a UK study indicates direct cost for back pain problems was £1632 million and total cost was £10668 million in 1998.[41] Data from a U.S. national insurance indicate that back pain treatment claims account for 16% of all workers' compensation claims and 33% of total claims costs. In California, agriculture sector alone, the annual workers' compensation costs for the more than 3,000 back injuries that happen each year may be over $22 million.[44]

According to Canadian Community Health Survey (cycle 3.1) in 1994, the estimated cost of back and spine disorders in Canada was $8.1 billion in Canadian dollars.[45] In

Germany, in year 2002 alone, the direct cost for back disorders in children and young age groups accounted for more than 100 million Euros.[25] NIOSH identified average cost of $18,000 per back injury, excluding indirect costs with total cost of $460.9 million for 10 years 1995-2005.[46]

A cost effectiveness study in industrial setup, showed that there was 2.2 days /person /year loss in work with 1.7 days/ person/ year- doctor certified and 0.5 days/ person /year- self reported. They lost total of 66,000 days (out of 17500 × 365 days) due to musculo-skeletal disorders at a total cost of £3.3 million.[47] Similarly a study in USA said that LBP is contributing to 40% of all lost work days.[14]

If we consider intensive multidisciplinary bio-psychosocial rehabilitation with functional restoration, which is the ideal one and fullest attainable one, all these estimated cost for the burden will increase drastically.[27, 36, 48]

1.5 Back pain morbidity (world and India)

WHO report on global health risks says LBP is a major cause of morbidity.[39] In literature, sometimes backache problem is called as epidemic disease of industrialized world.[23] LBP is always considered as major health problem in developed countries but not in developing world. This is mainly because in countries like India very small portion of population is involved in formal job sector where records are kept for health expenditure; making it difficult even to guess health and economical effects of backache problems. Other difficulty is posed by the fact that a large share of health care is provided by private sector that too without any recording and major portion of the expense is by out of pocket (73.5%- NHA 2001-02) by the patients themselves.[49]

Days of absence due to LBP per patient per year ranging from 9 days in the United States, to 10 days in West Germany, to 20 days in Canada, to 25 days in the Netherlands, to 30 days in Great Britain, and to 40 days in Sweden.[50]

1.6 Backache among drivers

Unlike India, vehicle driving is not a permanent job for most of the drivers in the developed world. So the health effects are not grossly visible world wild. May be this is the reason why Occupational factors for drivers are not fully studied,[51] There are very few studies which simultaneously look at both the issues i.e. standards of the vehicles,working conditions and their effects on human health,[52, 53] mainly because these risk factors are exclusive for this group of profession and it needs experts of divers disciplines to work together. There are very few studies which give emphasis on exposure data due to cumbersome procedure of measuring the vibration exposure[52, 54] and related energy transfer to spine and para-spinal tissues. Hence it is difficult to conclude equivocally the association between some of the occupational risk factors and LBP.

Heavy motor vehicle (HMV) drivers are considered at greater risk than smaller vehicles or cars drivers because they are exposed to vibration levels close to resonance frequency of lower spine.[52] Studies showed that that there is high prevalence of disc prolepses and degenerative changes among HMV drivers compared to other people.[52, 55] A study in India on tractor drivers found that though there is higher prevalence of the backache among the heavy motor vehicle drivers, MRI showed no pathological differences between drivers and non-drivers.[53]

1.7 Occupational factors

As per WHO report back pain is the top most factor in occupational risk.[22] It is very difficult to find single effective intervention for the prevention of backache on large scale, but in one type of occupational set up we can focus on some particular modifiable risk factors. So epidemiological approach, in this context can help us to understand and intervene the hidden side of the problem.[52, 55]

There are instances that changes have occurred in international standards for the measurement of vibration on drivers seats based on some of the epidemiological studies. For example- the "fatigue decreased proficiency" (which has higher and lower limits of vibration) concept changed to the "crest factor" concept with maximum limit of 9 (Crest factor-it is peak-to-average power ratio -PAPR is a measurement of a waveform, calculated from the peak amplitude of the waveform divided by the RMS value of the waveform.[56]) for measurements of vibration based on such a recent research, accepting there is need for further research in this area.[51, 55]

As per National Institute of Occupational Safety and Health (NIOSH)- USA, for work related LBP following 5 factors are primarily considered to be significantly important.

1. Heavy physical work,
2. lifting and forceful movements,
3. bending and twisting (awkward postures),
4. whole-body vibration (WBV),
5. static work postures.[4]

Out of which drivers are exposed to last 3 factors, which makes this group highly vulnerable for bad health outcomes in terms of LBP. Drivers are not aware of this risk, and worst part is no one has precise idea how much risk they are exposed to.

It is suggested in few studies that higher prevalence of backache is likely to be due vibration exposure and prolong awkward sittings[57, 58] but very few are proving the same scientifically.

A study in India says vibration transmission causes back problems because of tissue failure or from metabolic interference, or a combination of both.[53] Also it is shown that the effect of various ill-factors accumulate over a period, eventually overcoming the protective mechanisms at microscopic levels in the tissues of spine.[15] This leads to various pathologies of spine and back.

A prospective study found that the work related psychological factors affect the LBP outcomes independently from work related physical conditions in drivers.[32]

1.8 Tobacco use and back pain

There are ambiguous results about the association between personal habits like smoking and musculo-skeletal pain, especially back pain. There are various hypothesis put forward but none of them were unequivocally proven.

A meta-analysis of 81 research papers concluded that there is a modest association between current smoker and back pain in adolescent age group and never smoked group have less prevalence as well as incidence of back pain.[42]Studies show that any form of tobacco (smoking and smokeless) is associated with backache and disk degenerative problems.[59]

A review study of 40 articles concluded that it is not possible to infer that smoking is a causative factor for non-specific backache. At the same time they have mentioned the need of sound scientific studies on the issue.[60]

A study which evaluated 16 research papers found that there is higher incidence of back pain and other related problems are more among smokers compared to non-smokers.[61] Some studies also have shown that there is dose-response relationship between number of cigarettes smoked Vs intensity and duration of low back pain.[62, 63] Among back pain patients the pain persisted in more percentage of smokers.[64] Also in Canadian Community Health Survey in 73,507 people, it was found that prevalence of LBP was 23.3% among daily smokers and 15.7% among non-smokers.[45]

An experimental study found that after exposure to the tobacco smoke there is down-regulation of collagen gene within 7 weeks and adverse histological changes were seen in the components of intervertebral disk (nucleus pulposus and the anulus fibrosus) after 2 weeks of smoking.[65]

1.9 Mechanisms and patho-physiology of low back pain:-

Various mechanisms are proposed with which these work related factors and tobacco products lead to backache. Lower part of our back is an area which contains highest number of pain producing structures in it.[66] And this further leads to many difficulties to reach to the cause of pain and assessing the validity of new hypothesises.

Various papers propose following mechanisms to backache induction by smoking.

- Hypo-perfusion theory: - it basically says that through various mechanisms the blood flow to the spinal and para-spinal tissues is decreased. It can cause

degenerative changes in the spinal tissues and makes para-spinal muscles weak. This will induce pain.[43]

Causes for such disturbances in blood flow are [67]:-

1. Smoking induced vaso-constriction[59]
2. Vibration induced vaso-constriction
3. Malnutrition of inter-vertebral disk (IVD) by carboxy-haemoglobin-induced anoxia or chronic vasoconstriction.[59]
4. Smoking induced atheroma of blood vessels and hypo-perfusion.

- Degenerative changes in the spinal tissues can induced by :- [52, 68]

1. Smoking induced cell apoptosis and degeneration[59]
2. Faulty synthesis of disc macromolecules
3. An imbalance between disc matrix proteinases and their inhibitors
4. Smoking induced changes in gene expression, causing down-regulation of collagen genes which precedes the histological changes in the intervertebral discs.

- Other causes:-

1. Coughing by smokers: - raises intra-abdominal pressure frequently putting them on more risk for inter-vertebral disk protrusion[67], also compromising the stability of spinal and para-spinal muscles.[45, 61]
2. Unhealthy life-style of smokers like physical inactivity, alcohol, overeating and bad postures.[61]
3. Abnormalities in neuro-peptids due to smoking[10]

It is also seen that disc degeneration of cigarette smokers is of more severe degree than that of non-smokers.[68] The smoking induced degenerative changes are so prominent and early that they could be found far earlier than that of the

related cardiovascular diseases.[69] there are studies indicating the results of experiments on animals showing there is low blood supply and low solute supply just after smoking due to nicotine.[61] Studies show that there is significant correlation between aging, high BMI, high LDLc, the other risk factors of atherosclerosis and IVD degeneration.[70] So it will be possible to diagnose either spinal pathological conditions early if we could understand the relation between them and back pain through epidemiological investigations.[52]

1.10 Rational:-

As mentioned above drivers are exposed to many identified risk factors viz- bending and twisting (awkward postures), whole-body vibration (WBV), static work postures.[4]

Vibration after prolong exposure causes end-arteries to constrict for prolong duration or permanently leading to hypo-perfusion of the spinal tissues and para-spinal muscles. This leads to weakening and degeneration of the spinal tissues and para-spinal muscles.[52]

To make all the study subject comparable bus drivers are chosen. All of them will be exposed to similar type of vehicle, so most of the risk factors will be similar. Their duty hours, engine characters, vibration, work practises will be same, making them comparable with less inter-driver differences. Awkward positions and static work postures lead to injuries as there is no time to recover properly and risk factors' effect get accumulated. It results in to degenerative changes as well as weakening of the tissues. Usually these kind of spinal problems are associated with low back pain

significantly. So if we can see what is the magnitude of this problem among the drivers as compared to non-driver population and how some of the work related or behavioural risk factors are distributed, then we can provide some evidences for the validity of these hypothesises which are not fully proven yet.

Need for corrective measures

Importance of ergonomics has grown recently in industries as well as in daily life. Incorporation of these principles has been proven to be very beneficial, for example - At Rover group workers were taught the importance of ergonomics resulting to decrease in the incidence of musculoskeletal problems.[47] Such steps can improve the life of people at risk as well others.

1.11 Objectives

1. To assess the prevalence of chronic low back pain in bus drivers.
2. To find its association with occupational & behavioral practices.

Chapter: 2

Methodology

2.1 Conceptual framework: - (Figure- 1)

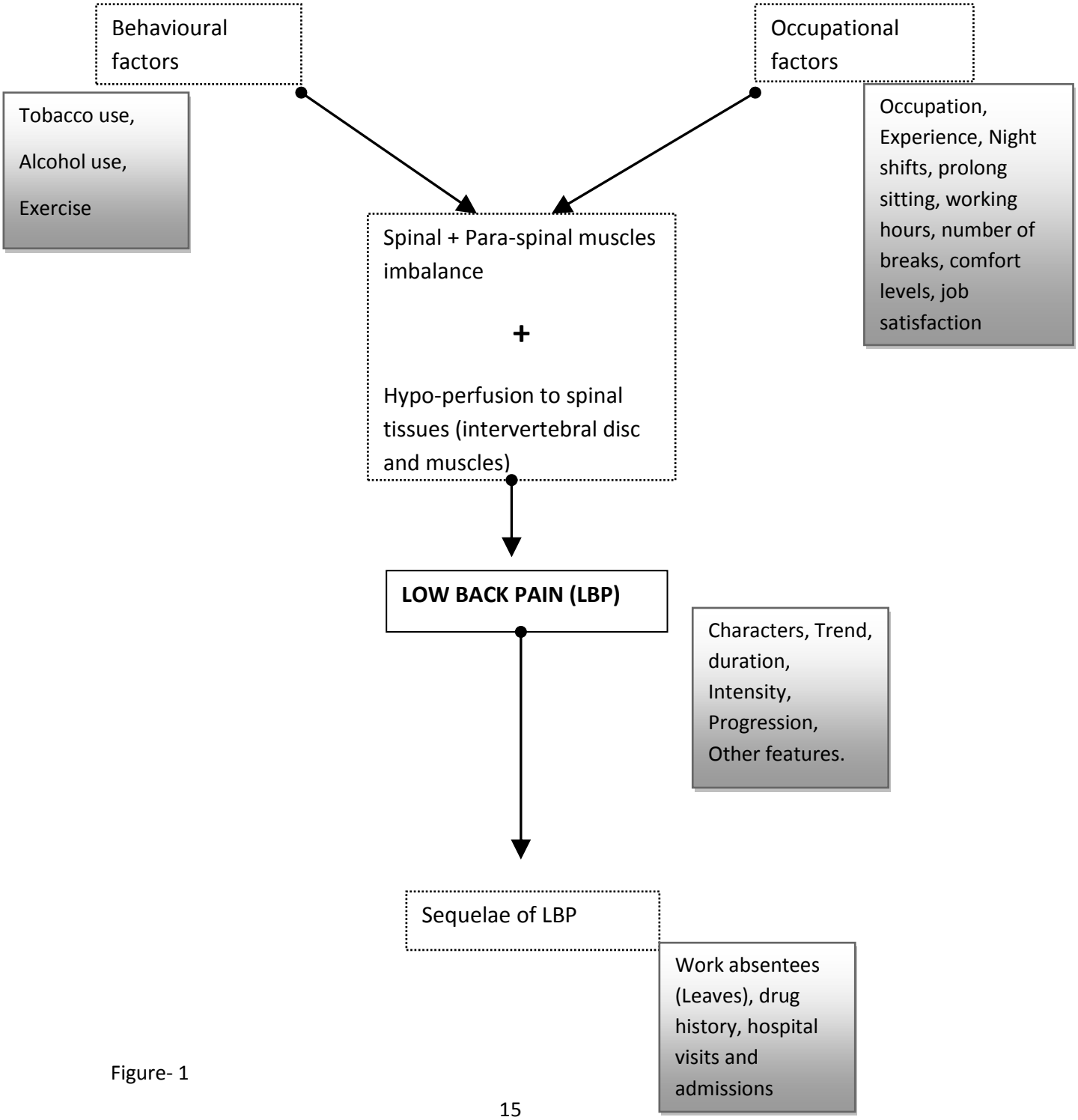

Figure- 1

2.2 Study design:

This was a cross-sectional study comparing two groups.

This methodology was adopted to counter time and financial constraints

2.3 Study setting:

Study was conducted in Latur district of Maharashtra, in a government setup of Maharashtra state road transport corporation (MARTC) depot. Latur city has a main bus depot, a workshop and a main district office which serve 10 talukas of Latur district.

2.4 Sample size:

The sample size was calculated with the help of - "Epi-info 3.5.2"

Based on other studies it was assumed that prevalence of low back pain among drivers is 40 % and among non-drivers 25%.[71]

Alpha error was set to 5% (95 % confidence interval) and power of the study at 80%. Then the calculated sample size was 165 in each group.

After adding 10% non-response rate and rounding off the values the calculated sample size becomes 370 (with 1:1 ratio of exposed and unexposed).

2.5 Sample selection procedure:

All the drivers from the depot were tried to be contacted for exposed group and as many people as possible were contacted randomly for unexposed group.

2.6 Inclusion criteria:

2.6.1. For exposed group:- drivers under Latur bus depot

2.6.2. For unexposed group: - all non-drivers workers under Latur bus depot of MSRTC.

2.7 Exclusion criteria:-

2.7.1. For exposed group-

- Drivers with less than 2 yrs experience (the effect of occupational factors was not supposed to be immediate. To be safer side, the drivers with less than 2 yrs experience were excluded).
- Drivers with low back pain before joining the job.

2.7.2 For unexposed group-

- Conductors (conductors were excluded because they were also exposed to vibration and jerks from the vehicle)
- Workers with any anatomical deformity (congenital/ post-natal)
- Women were excluded because in exposed group there were only men.

2.8 Data collection technique:

2.8.1 Data collection tool:-

Self-administered questionnaire

The whole questionnaire was constructed by principal investigator and it was passed through the Technical advisory committee (TAC) as well as by Ethical committee (IEC)

of Sree Chitra Tirunal Institute for Medical Sciences and Technology (SCTIMST), Trivandrum.

2.8.2 Data collection method:-

The questionnaire was translated to Marathi (local language) and distributed to the participants at their convenient time (in breaks/ before work /after work) after taking consent.

The principal investigator was around to assist in case of difficulty in understanding. In case of difficulty the guidance was provided to understand the question and to choose the proper option.

2.8.3 Participant flow

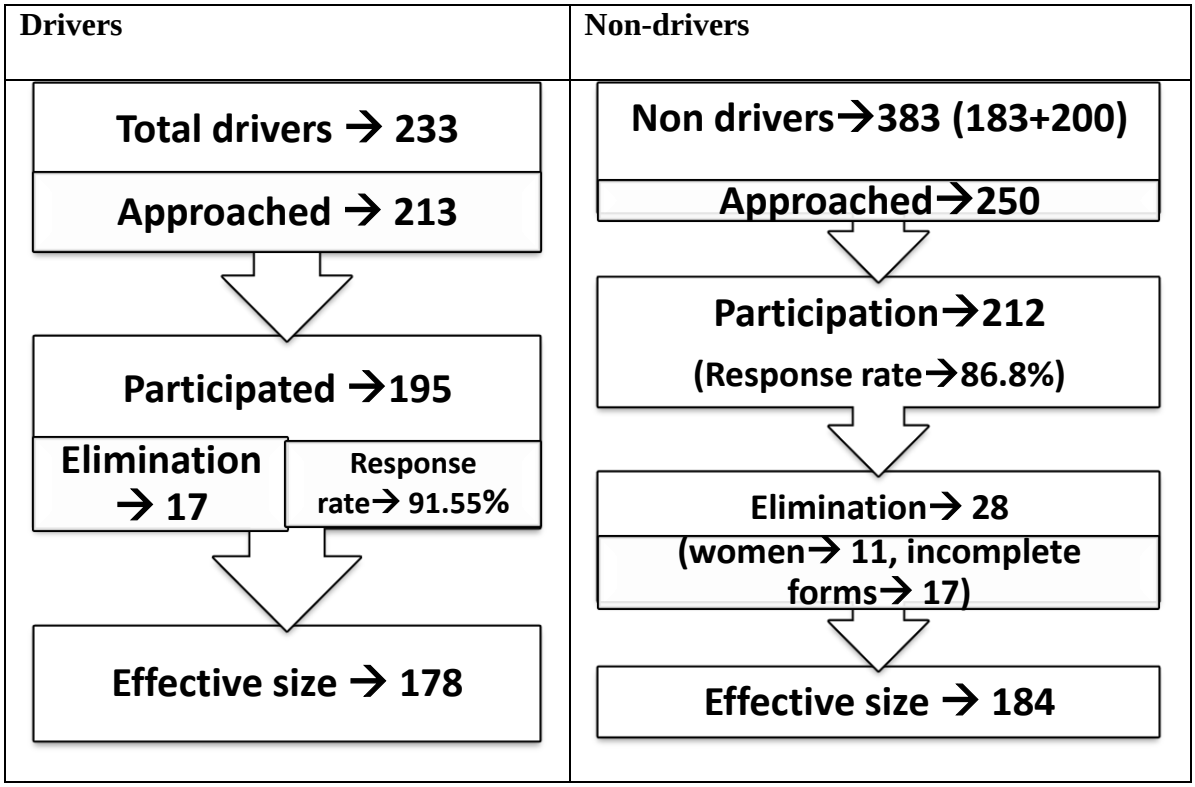

Figure- 2

2.8.4 Time line:-

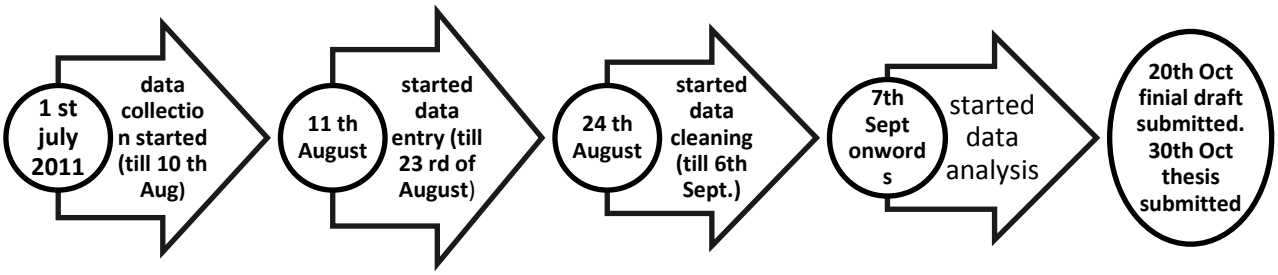

Figure- 3

2.9 Variables used

2.9.1 Demographic factors

Age: - It was collected as reported by the subjects, with the aim to find the association between age and LBP.

(All the participants were males, mainly because driving is male dominated occupation, specially the bus-driving. All the driver individuals in the bus depot were males. So in their comparison group of non-drivers also only males were taken.)

2.9.2 Work related factors

1. **Occupation**: - two categories were made as drivers and non-drivers.
2. **Duration of service** (years of experience):- self reported answer for duration of their service in that setup.
3. **Duration of work**: - duration of work in hours per day.
4. **Prolong sitting**: - it was assessed by asking average duration of daily maximum prolong sitting in one position in hours for last year.

5. **Night shifts**:- this information was collected by asking two questions i.e. do you work in night shifts currently and if yes what was the frequency of number of last month's night shifts (from the given choices).
6. **Breaks**: - frequency of breaks (resting stops in journey) per day and activity in those breaks like sitting, standing, walking around or laying down was captured.
7. **Feeling at the start and end of the work**: - Person's subjective feeling about comfort levels were asked among the five choices. Question was asked separately for- at the start and at the end of the work. "How do you feel at the start /end of the day?" An option was given to say "no opinion" and these people were excluded while analyzing these questions.
8. **Job satisfaction** was asked accessed by satisfaction level of their present work giving three choices of fully satisfied, moderately satisfied and not satisfied.

2.9.3 Lifestyle related variables

1. **Current Tobacco use: -**

   It was captured by asking "do you consume any of the following tobacco products?" If yes then information about form and quantity of tobacco use was collected.

   It was anticipated that in this area non-smoke tobacco will be used more hence question was also asked about average duration of chewing tobacco per day. It was the multiplication of duration of chewing tobacco on one occasion and frequency of tobacco chewing per day. This method was adopted to quantify tobacco use because unlike cigarettes, tobacco use cannot be quantified and tobacco packing is also not standard.

   Another variable – "time to first use of tobacco after waking-up" which was the time interval between waking-up in the morning and using tobacco first

time in the morning in minutes. It has been shown that shorter the duration more is the tobacco dependence[72, 73]

2. **Alcohol use: -** It was recorded by self response of the individual in two questions. Do you consume alcohol and if yes what is the quantity- ___ quarters/ week (1 quarter=180ml).
3. **Exercise:-** question about regular exercise was asked and if response was 'yes' then further information like frequency per week, duration and exercise form was asked.

2.9.4 Outcome variable- Back pain

Presence of back pain was accessed by the question "Did you ever have any backache problem till date?" which included all the three parts of the back i.e. upper (cervical), middle (thoracic) and lower (lumbo-sacral). If the response was yes then presence of low back pain (LBP) was asked with the help of a pictographic question, if answer was yes then further information about LBP was collected like- duration, intensity, trend, characters, and aggravating factors.

2.9.5 Sequelae of LBP:-

1. **Drug history: -**first use of any type of medication for LBP ever was asked if the response was yes then similar question for last year was asked.
2. **Use of health care facility** specifically for LBP was asked.
3. **History of hospitalization** due to LBP was asked along with number of hospitalized days.

4. **Absentees from work**:- This was captured by asking – Have you ever taken leave due to LBP if the answer was yes then duration of all the leaves due to LBP was asked.
5. **Pain intensity**: - Intensity of the worst ever LBP and intensity of the existing LBP was asked along with duration of that pain. For this purpose a question was constructed with 1 to 10 options in incremental order for LBP-intensity i.e. it was a non-validated analogue scale with ten incremental choices. This method had two benefits. Being an objective instrument, time in validation was saved and second was- it became easy for responders to choose their level of intensity more accurately.

While analyzing, the mean scores were calculated for both groups and compared statistically. Also a weighted scale factor was calculated by multiplying intensity levels with duration (converted in years) of that pain intensity and compared across the groups. This factor "pain duration score" gave a combined effect of pain intensity as well as duration of that pain.

6. **Pain free interval**: - first it was asked about the presence of pain free periods in last year. If the answer was yes then information collected about their frequency in last year.

2.10 Data analysis:-

2.10.1) Procedure:-Data was entered in SPSS-17 for analysis. The data was analysed to estimate prevalence of outcome variable (low back pain) also of the risk factors and Chi square test (for categorical variable) or Independent T Test (for continuous variable) was done to check the significance of the difference between the two groups.

Bivariate analysis was done to see the association between the outcome variable (low back pain) and individual risk factor. Findings were reported in terms of percentages, Prevalence ratios, Pearson's chi square tests and correlations. Multivariate analysis with binary logistic regression was done by enter method with low back pain as outcome variable.

2.10.2) Expected out-comes:-

1. Prevalence of LBP and its difference between the two occupational groups.
2. Prevalence of the risk factors for LBP and their difference between the two occupational groups.
3. Association between the risk factors and LBP.

2.11 Ethical considerations:-

There were no significant ethical issues involved as the tool was a self administered questionnaire and no invasive procedure was used, Also all the study subjects were major and male.

2.11.1) Risks to participants: - There was no any risk due to participation in the study except loss of time and little inconvenience of the venue for filling the questionnaire i.e. their working place. Care was also taken to keep the inconvenience to the minimal levels by keeping the questionnaire short. Also there were no any invasive procedures.

2.11.2) Privacy and confidentiality: - The name and contact number of the participants were optional. Participants were told in consent that information reviled by them will be confidential forever. Apart from that they were given option not to answer any question if

they were not comfortable. In analysis they were given unique identification code, which principal investigator alone can tress back to their identity.

2.11.3) Informed consent process: - The consent form in local language (Marathi) with the contact numbers of thesis supervisor and ethical committee head was given prier to questionnaire and there was no pressure of any type on subjects to participate in the study.

2.11.4) Benefits:- This study did not have any direct benefit to the participants however this study may prove beneficial to public health at large and may be utilised in refining the policy about working conditions of drivers as well other professions.

CHAPTER 3

Results

3.1 Sample information:

The information included in the analysis was of 362 subjects of whom 178 were drivers (response rate-91.55%) and 184 were non-drivers (response rate-86.8%). Non-responders were not different than participants. Most of the non-participants didn't have time.

3.2 Baseline characteristics:

The mean age of all the respondents was 43.62 yrs, and there was no significant difference between the mean (SD) age of drivers 42.71 (8.951) and non-drivers 44.49 (10.168) with p value 0.077. This suggests these two occupational groups were comparable.

Table 1 Basic characteristics of the study sample

Variable name	**Drivers-178**	**Non-drivers- 184**	**Overall-62**	**p value**
Mean age	**42.71**	**44.49**	43.62	0.077
(in yrs)	(Min-24) (Max- 58)	(Min-9) (Max- 59)		
Experience	**16.486**	**19.232**	17.884	0.008
(in yrs)	(Min-2) (Max- 38)	(Min-2) (Max-36)		

Source: Primary study

The mean (SD) years of experience of drivers and non-drivers were 16.486 (9.398) and 19.232 (10.093) respectively, which were significantly different (p = 0.008). Lesser mean years of experience of drivers was because of changing employment in this occupation

line and late entering of the drivers in this setup. Also drivers have given their experience in this department only excluding their duration of service in previous setups. Hence the mean years of experience of these two groups were not comparable (But as the mean years of drivers is less as compared to non-drivers it was not likely to affect the results adversely, if at all LBP is associated with years of experience. Hence adjustment was not done for years of experience in bivariate analysis).

3.3 Basic characteristics of each group:

The details of all the variables were provided for both the group simultaneously. Wherever required the comparison between the two is given after performing chi-square test to know whether the difference between the two groups was significant or not.

The baseline characteristics of the participants were collected under following domains and they were compared between exposed and unexposed group.

1. Work related risk factors
2. Behavioural risk factors
3. Prevalence of backache and LBP (dependant variables)
4. Sequelae of LBP

3.4 Work related factors

3.4.1. Night shift patterns (Table-2):- Most of the drivers used to work in night shifts, where as only a small sub-group of unexposed participants used to work in night shifts. 66.3% of drivers went for night shifts in last one month, out of which more than 50% did

night shifts for more than 10 days in last months. In total sample more than 59% did the night shifts for more than 10 times in last month.

Table 2 Night shifts pattern (in last month)

Variable name	Drivers-178 N (%)	Non-drivers-184 N (%)	Overall-362 N (%)
Night shifts in last month	118 (66.3)	32 (17.4)	150 (41.4)
No. of night shifts in last month			
1 to 4	18 (15.3)	1 (3.1)	19 (12.7)
5 to 10	40 (33.9)	2 (6.2)	42 (28.4)
11 to 20	50 (42.4)	29 (90.6)	79 (52.7)
20<	10 (8.5)	0 (0)	10 (6.7)

Source: Primary study

25.8% drivers and 56.5% of non-drivers were fully satisfied with their job, i.e. non-drivers were two times more 'fully-satisfied' compared to drivers and this difference was significant. Also the proportion of drivers (28.7%) who were not satisfied with their job was significantly higher (about four times) as compared to non-drivers (7.6%).

3.4.2 Other work related factors (Table-3):- For question regarding comfort level at the start of work 352 (97.2%) participants responded- 174 (97.8) drivers and 178 (96.7%) non-drivers, (non-responders were eliminated from the analysis). The comfort levels of drivers and non-drivers at the start of the work were significantly different (P value <0.001) where only 36.2% of drivers were fully comfortable as compared to 48.3% that of non-driver.

Table 3 Variables on work related factors

Variable name	Drivers-178 N (%)	Non-drivers -184. N (%)	Overall-362 N (%)	p value
Job Satisfaction				
fully satisfied	46 (25.8)	104 (56.5)	150 (41.4)	
moderately satisfied	81 (45.5)	66 (35.9)	147 (40.6)	<0.001
not satisfied	51 (28.7)	14 (7.6)	65 (18.0)	
Sitting in 1 position (>2 hrs)	142 (79.8)	44 (23.9)	186 (51.4)	<0.001
feeling at the start of work*	**No-174**	**No-178**	**No-352**	
fully comfortable	63 (36.2)	86 (48.3)	149 (42.3)	<0.001
slight uncomfortable	59 (33.9)	69 (38.8)	128 (36.4)	
moderately uncomfortable	52 (29.9)	23 (12.9)	75 (21.3)	
Felling at the end of work**	**No-177**	**No- 181**	**No-358**	
fully comfortable	3 (1.7)	11 (6.1)	14 (3.9)	<0.001
slight uncomfortable	19 (10.7)	41 (22.7)	60 (16.8)	
moderately uncomfortable	83 (46.9)	92 (50.8)	175 (48.9)	
totally uncomfortable	72 (40.7)	37 (20.4)	109 (30.4)	

Source: Primary study. *** 10 participants chose option 'can't tell' (4 drivers and 6 non-drivers); ** 4 participants chose option 'can't tell' (1 driver and 3 non-drivers)**

Feeling at the end of work was significantly different between the two groups (P value= <0.001). For this question 358 (98.9) subjects responded -177 (99.4%) drivers and 181(98.4%) non-drivers. At the end of work 40.7% drivers feel totally uncomfortable as compared to 20.4% that of non-drivers, i.e. drivers were two times more likely to be 'totally uncomforted' as compared to non-drivers.

3.5 Behavioural factors :- (Table-4)

Table 4 Variables on behavioral characteristics of the study sample

Variable name	Drivers- 178 N (%)	Non-drivers- 184 N (%)	Overall- 362 N (%)	p value
Alcohol consumers	43 (24.2)	35 (19.0)	78 (21.5)	0.115
Mean quantity of alcohol (quarters/wk)	1.86	2.94	2.35	0.060
Exercise doers	35 (19.7)	76 (41.3)	111 (30.7)	<0.001
Mean duration of exercise min/day	30.14	34.74	33.29	0.142
Current tobacco users	142 (79.8)	86 (46.7)	228 (63)	<0.001

Source: Primary study

Here alcohol use was recorded as self-reported by the participants, which may not give the actual use of alcohol by the individuals. As given in table-4, more drivers consume alcohol as compared to non-drivers, but this difference was not statistically significant. Among those who consume alcohol, the quantity of alcohol consumed per week was significantly higher among non-drivers compared to drivers.

Nearly one third people from the total sample go for regular exercise. There was significant difference between the two occupational groups; with number of non-drivers (41.3%) doing regular exercise was twice that of the drivers (19.7%).

Among drivers the percentage of the people using tobacco currently was significantly higher (79.8%) as compared to non-drivers (46.7%). The overall 63% of the sample was consuming tobacco in some form.

3.5.1. Details of tobacco consumption:-

Figure 4 Forms of tobacco used

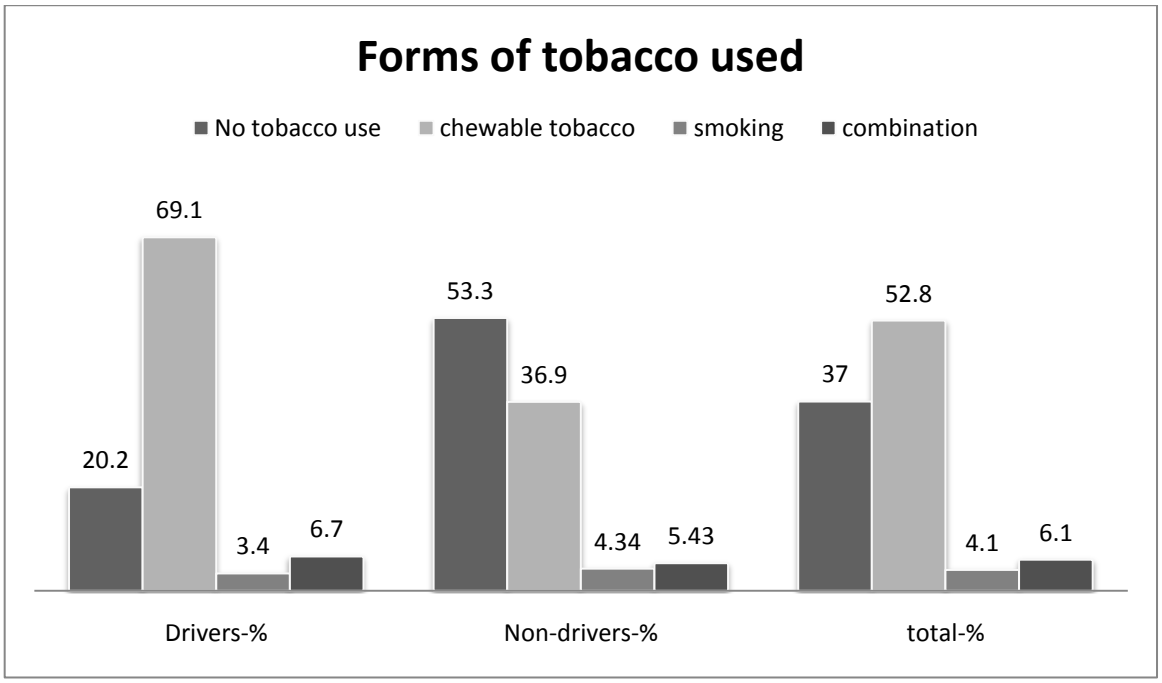

Figure- 4

It is clear from table-5 that among the drivers those who chew tobacco, 62.9 % chew tobacco more than 1 hr as compared to 43.6 % that of the non-drivers and this difference was statistically significant (P value= 0.001). It implied that not only the percentage of drivers consuming tobacco was more but also among tobacco consumers the drivers were using it (chewing) for longer duration.

Table 5 Tobacco consumption pattern

Variable name	Drivers-178 N (%)	Non-drivers-184 N (%)	Overall-362 N (%)	p value
duration-chewing tobacco/day #	**No- 135**	**No- 78**	**No-213**	
Up to 10 min	5 (3.7)	16 (20.5)	21 (9.9)	
11 to 30 min	11 (8.1)	10 (12.8)	21 (9.9)	
31 to 60 min	34 (25.2)	18 (23.1)	52 (24.4)	0.001
1 to 2 hrs	38 (28.1)	15 (19.2)	53 (24.9)	
More than 2 hrs	47(34.8)	19 (24.4)	65 (31.0)	
Time to first tobacco use after waking up ##	**No-142**	**No-86**	**No-228**	
within 5 min	76 (53.5)	38 (44.2)	114 (50.0)	
Within 6to30 min	26 (18.3)	13 (15.1)	39 (17.1)	
within31 to 60 min	8 (5.6)	6 (7.0)	14 (6.1)	0.271
more than 60 min	32 (22.5)	29 (33.7)	61 (26.8)	

Source: Primary study. #- only people with chewable tobacco were included in this analysis. ##- only tobacco users were included in this analysis.

The time to first use of tobacco after getting up is correlated with tobacco addiction.[72, 73] Shorter is the time higher is the addiction. But here there was no significant difference between these timings of both the groups. So we can conclude that among the tobacco

users of both the groups, there was no significant difference in the variable suggesting addiction levels.

3.6. Prevalence of backache and LBP:- (Table-6)

Table 6 Prevalence of backache and LBP

Variable name	Drivers-178 N (%)	Non-drivers-184 N (%)	Overall-362 N (%)	p value
ever had backache	137 (77.0)	116 (63.04)	253(69.89)	0.004
neck pain	53 (29.78)	36 (19.57)	89 (24.59)	0.024
pain in middle back	33 (18.54)	39 (21.20)	72 (19.89)	0.527
Low back pain (LBP)	126 (70.8)	95 (51.6)	221 (61.04)	<0.001
Mean duration of LBP(yrs)	5.252	4.973	5.131	0.655
LBP prevalence				
10 yr prevalence	126 (70.8)	95 (51.6)	221 (61.0)	<0.001
5 yr prevalence	125 (70.2)	93 (50.6)	218 (60.2)	<0.001
1 yr prevalence	120 (67.4)	85 (46.2)	205 (56.6)	<0.001
Current LBP suffers	114 (64.0)	82 (44.6)	196 (54.1)	<0.001

Source: Primary study

The life-time prevalence of backache was significantly higher in drivers (77%) as compared to non-drivers (63.04%).

The difference in prevalence of neck pain among the two groups was statistically significant with drivers and non-drivers having neck-pain prevalence 29.78% and 19.57% respectively.

Prevalence of Low back pain (LBP) was significantly high among the drivers (70.8%) as compared to that of non-drivers (51.6%).

The table 6 also provides 10 yr, 5 yr, and 1 yr prevalence of LBP. Here 1yr group is a subset of 5yr group and 5 yr group is subset of 10 yr prevalence group. In all the domains the LBP prevalence was higher among drivers. The point prevalence of LBP (i.e. the percentage of current LBP sufferers) was high among drivers (64.0%) as compared to non-drivers (44.6%) and this difference was statistically significant.

As shown in table-6 once someone was LBP sufferer, the chances of recovery were very less as very few people came out of 10 yr prevalence group. It means once someone becomes a chronic LBP sufferer, likely to be a sufferer forever.

3.6.1. Further details of LBP:- (Table-7)

Table 7 Further details of LBP

variable	Drivers-126	Non drivers-95	Total-221	P value
Time-Trend of LBP				
Increasing	62 (49.2)	46 (48.4)	108 (48.9)	
Decreasing	17 (13.5)	16 (16.8)	33 (14.9)	0.774
No change	47 (37.3)	33 (34.7)	80 (36.2)	

Chronicity of LBP				
Acute (<1 wk)	27 (21.4)	36 (37.9)	63 (28.5)	
Sub-acute (1to 12wk)	7 (5.6)	11 (11.6)	18 (8.1)	0.003
Chronic (>12 wks)	92 (73.0)	48 (50.5)	140 (63.3)	

Source: Primary study

Table-7 focuses on the patterns and other characteristics of LBP in the two groups. As evident in the table there was no significant difference between drivers and non-drivers in the time trend of LBP. Both the groups follow more or less similar time trend. But these two groups differ significantly (P value = 0.003) in chronicity with the percentage of chronic LBP sufferers more among drivers (73%) as compared to that of non-drivers (50.5%).

3.7. Sequelae of LBP :- (Table-8)

3.7.1 Medication: - near about half of the drivers (49.4%) have used some form of drug ever for low back pain, on the other hand this proportion was about one third among non-drivers (31.5%) and this difference was significant. 36.5% drivers and 21.7% non-drivers have used drug for LBP in last year. This difference was also statistically significant.

Table 8- Sequelae of LBP

Variable name	**Drivers-178 N (%)**	**Non-Drivers-184. N (%)**	**Overall-362 N (%)**	**p value**
Ever used drug	88 (49.4)	58 (31.5)	146 (40.3)	0.001

Drug use last yr	65 (36.5)	40 (21.7)	105 (29.0)	0.002
Ever used HCF for LBP	62 (34.8)	35 (19.0)	97 (26.8)	0.001
Ever admitted Due to LBP	14 (7.9)	14 (7.6)	28 (7.7)	0.927
Ever taken leave due to LBP	51 (28.7)	29 (15.8)	80 (22.1)	0.003
LBP	**No-125**	**No-95**	**No-220**	
No. of days admitted	**mean- 1.18**	**Mean-2.04**	**Mean- 1.55**	0.019
	Sum- 147	Sum- 194	Sum-341	
	Max-30	Max- 45	Max-45	
Duration of leave	**Mean- 8.74**	**Mean-11.09**	**Mean-9.70**	0.046
	Sum-1093	Sum-1054	Sum-2147	
	Max-90	Max-240	Max-240	
Any Pain free periods last yr	21 (16.8)	27 (28.4)	48 (21.8)	0.039

Source: Primary study

3.7.2 Use of healthcare facility: - 34.8 % drivers have sought help from some type of health care facility specifically for LBP. This percentage among non-drivers was 19% which was significantly less, statistically.

3.7.3 Admissions due to LBP:- But here it was found that percentage of admissions in hospitals due to low back pain in both the groups were not significantly different, implying the possibility that most severe forms of LBP which require hospitalization were not much affected by occupational factors.

3.7.4 Absentees due to LBP:- Though significantly higher proportion of drivers (28.7%) were taking leave for LBP as compared to non-drivers (15.8%), the mean duration of leave was 8.74 days for drivers and 11.09 days for non-drivers.

3.7.5 Pain free period: - As indicated in this table the number of people with pain free period in last year were less for drivers (16.8%) compared to non-drivers (28.4%) and this difference was statistically significant indicating the recovery among the drivers was most likely to be less.

3.8 LBP pain intensity: - (Table-9)

To detect level of pain intensity among LBP sufferers a non-validated analogue scale is used with ten incremental choices, i.e. it was like an objective scale with scoring from one to ten. The purpose was just to compare the pain intensities within this sample. So as the subjective component was removed, the intensity scores can be compared using non-parametric test (Mann- Whitney).These scores taken for 'maximum LBP ever had' and 'current LBP'.

It was found that the mean score for 'maximum pain intensity ever had' was higher among drivers and this difference was statistically significant. Similarly mean score for current LBP intensity is significantly higher.

Also a variable was computed by multiplication with time factor for that pain intensity and this was also compared between the groups. The mean scores of this question among two groups were compared using non-parametric test (as these scores may not be symmetrically distributed). Hence it was the median score.

It was found that maximum pain duration score was lesser among the drivers but current pain duration score was higher among drivers. However these differences were not statistically significant.

Table 9 Pain intensity scores

Variable name	**Drivers-178**	**Non-Drivers-184**	**Overall-362**	**p value**
LBP / **Mean scores**	**No-125**	**No-95**	**No-220**	
Max pain ever	6.23	5.78	6.04	0.030
Max. pain-duration score (median)	22	48	29	0.084
Current pain	4.63	4.25	4.47	0.048
Current pain duration score (median)	120	72	96	0.074

Source: Primary study

3.9. Bivariate analysis:-

Bivariate analysis was done with low back pain (LBP) as outcome variable. Initially bivariate analysis was done taking whole sample of two groups

3.9.1. Bivariate analysis in whole sample with LBP as outcome variable:- (Table-10)

This was done to identify which variables could be risk factors or have significant association with LBP and these findings guided for further bivariate and multivariate analysis. Here only significantly associated variables are given.

Table 10 Bivariate analysis with LBP as outcome variable in whole sample

Variable name (second category is reference)	**Unadjusted Odds ratio**	**95% C.I. of OR**	**P value**
Occupation (driver/non-driver)	2.270	1.471- 3.502	<0.001
Tobacco consumption (yes/no)	1.884	1.218- 2.915	0.004
Early morning tobacco (within 30min/after 30 min)	2.192	1.231- 3.902	0.008
No. Of breaks (more than 2/2or less)	2.169	1.311- 3.589	0.003
Feeling at the start (uncomfortable/ comfortable)	3.202	1.738- 5.901	<0.001
Feeling at the end (uncomfortable/ comfortable)	3.065	1.828- 5.136	<0.001
Job satisfaction (unsatisfied/ satisfied)	2.456	1.320- 4.571	0.005
Duration of tobacco chewing (>1 hr/ <= 1hr per day)	1.638	1.005- 2.671	0.048

Source: Primary study

These were some of the important variables which can be considered as risk factors with low back pain. But to establish the association a separate bivariate analysis was needed in both the occupational groups.

3.9.2. Bivariate analysis among the driver group with LBP as outcome variable:- (Table-11)

Table 11 Bivariate analysis with LBP as outcome variable in drivers

Variable name (second category is reference)	**Unadjusted Odds ratio**	**95% C.I. of OR**	**P value**
Night shifts (yes/no)	1.105	0.557- 2.193	0.776
Tobacco consumption (yes/no)	1.742	0.809- 3.747	0.156
Early morning tobacco (within 30min/after 30 min)	2.424	1.101- 5.337	0.028
No. Of breaks (more than 2/2or less)	1.318	0.688- 2.523	0.405
Feeling at the start (uncomfortable/ comfortable)	4.408	1.748- 11.115	0.002
Feeling at the end (uncomfortable/ comfortable)	5.980	2.350- 15.219	<0.001
Job satisfaction (unsatisfied/ satisfied)	2.389	1.065- 5.361	0.035
Duration of tobacco chewing (>1 hr/ <= 1hr per day)	1.786	0.865- 3.685	0.117

Source: Primary study

So in separate analysis it was evident that for drivers early morning tobacco use (within 10 min of waking up), uncomfortable feeling at the start, uncomfortable feeling at the end and no job satisfaction were associated with LBP.

Many of the variables were not showing significant association with LBP. It can be due the fact that the sample size was decided mainly to detect the difference in prevalence of LBP between the two groups. Ideally different sample sizes should have been chosen for different variables (risk factors), and largest sample size should be chosen among those. But that would be a very large number to conduct the study in this scenario.

3.10. Multivariate analysis (Binary logistic regression):

Multivariate analysis was done using ENTER method, mainly because one variable of occupation (driver or non-driver) has to be there in the model irrespective of its statistical significance. Then only it was possible to explain the model and compare the risk factors between two groups.

Of all the variables (apart from occupation) only uncomfortable feeling at the start of work, uncomfortable feeling at the end of the work and time to early use of tobacco after waking up were found to be significantly associated with low back pain.

This model has Cox and Snell R square value 0.094. It means this model explains 9.4% of LBP in this sample. LBP has huge number of determinants and studying most of them will improve R square value but scope of this study is limited.

Table 12 Binary logistic regression model (LBP as outcome)

Variable name (Comparison groups- second category is reference)	**Adjusted OR**	**95% C.I. of OR**		**P value**
Occupation (Drivers/non-drivers)	1.650	1.025	2.657	0.039
Feeling at the start of work (Uncomfortable/ comfortable)	2.171	1.142	4.125	0.018
Feeling at the end of work (Uncomfortable/ comfortable)	2.228	1.294	3.836	0.004
Tobacco use (yes/no)	0.726	0.450	1.172	0.190

Source: Primary study

Chapter 4

Discussion

This study was conducted to detect the prevalence of chronic low back pain (LBP) among drivers and to compare it with other occupational groups and if possible to find association between some of the unproven risk factors and LBP.

4.1. Sample characters:-

Prevalence of chronic low back pain has bimodal peak when seen age wise with first pick after 20 years and other after 60 years.[74,75] This trend was difficult tress out in this study because all the respondents were above 19 years and bellow 60 years as it was a formal setup under state government with implied rule of retirement at 60 yrs.

Age distribution of some of the aetiological factors of LBP is very well understood but non-specific chronic LBP is showing diverse pictures in different studies. The natural history of LBP is not fully understood yet.[75] In this study also no specific age distribution of LBP was found.

Very well argued risk factors of LBP for drivers is vehicle induced vibration.[76] in this study, duration of experience was expected to give an account of exposure of this factor[55]. But no significant association was found between years of experience and LBP (here there was significant difference in the mean years of experience between the two groups with P value 0.008, but as the mean years of drivers is less as compared to non-drivers it was not likely to affect the results adversely hence adjustment was not done for years of experience)

4.2. Occupational risk factors:-

The risk factors like continuous sitting in one posture, less number of breaks, night shifts, whole body vibration and awkward postures are proposed to cause LBP.[4, 58, 71] In this study though vibration levels were not measures vibration dose exposed was captured in duration of experience i.e. years of experience can be called as proxy variable for vibration dose.[52] But here unlike other studies, no association was found in years of exposure and LBP. This suggested that there is need for very precise measurements of vibration to show its association with LBP which was done in some of the studies.

All other risk factors such as sitting in one posture, less number of breaks, night shifts and awkward postures are significantly high in drivers. It is also in line with the findings of other similar studies.[52, 55, 58, 71] But night shifts are not found to be associated with LBP, whereas less number of breaks (suggesting prolong sitting) were associated with LBP in preliminary analysis but not in multivariate analysis.

Job satisfaction and feeling at the work was also correlated with the LBP. These are relatively abstract things and difficult to capture and analyze.[76] To make sure that participant respond these questions properly, an extra option of "no opinion" was always provided with these questions and subjects who had chosen this option were eliminated from analysis. Job satisfaction is a subjective feeling which is out-put of many work related factors, so capturing it can give an overall picture of workers' conditions.[76] Very few studies have attempted to find its association with LBP. This study also gives a significant association between job satisfaction and LBP like other studies. This is also true for comfort levels at the start and at the end of the work. (Table-11)

4.3. Behavioural risk factors:-

4.3.1. Alcohol:-

Alcohol use is suspected to be associated with some of the chronic musculo-skeletal problems. This study showed that there was no association between alcohol and LBP. Another meta-analysis also concludes the same result.[77]Similar results of non-association were found in a study where blood tests were done to find the association between alcohol and LBP.[78]

4.3.2. Exercise:-

Lack of exercise is associated with musculo-skeletal problems including low back pain and also better recovery is seen in people doing regular exercise.[79, 80] This study found out that percentage of people doing exercise among drivers were significantly low (nearly half) as compared to non-drivers. Frequently changing schedules, night shifts and work related fatigue might be retarding drivers from going to regular exercise. But among those who used go for regular exercise, there was no significant difference in mean duration of exercise per day within drivers and non-drivers. It indicated that once drivers start exercise they are likely to follow regularity pattern like that of others.

4.3.3. Tobacco use:-

A meta-analysis concluded a modest association between current smoker and back pain.[42]While another review study shows no association between smoking and LBP.[60] In this setup chewable form of tobacco is more prevalent so effort was to find the association between chewable form of tobacco and LBP. But there is no any association between the two. But in bivariate analysis early morning tobacco use (within 30 minutes) was found to be significantly associated with LBP.

4.4 Prevalence:-

The point prevalence of LBP was 64.0% and 44.6% whereas 10 years' prevalence for LBP was70.8% and 51.6% among drivers and non-drivers respectively. This difference in prevalence is statistically significant. These findings are similar to the findings of other studies. Following table compares the findings of this study with other studies in which study group was HMV drivers.

Table 13 LBP prevalence among HMV drivers- values from other studies

Study	**Year of publishing**	**Study group**	**prevalence**
Bovenzi and zadini[55]	1992	Bus drivers	84% (life-time)
Anderson R.[81]	1992	Bus drivers	80.5% (point)
Bovenzi and Betta[57]	1994	Tractor drivers	81% (life-time)
Brendstrup and Biering[82]	1987	Truck drivers	79% (life-time) and 65 (1 yr)
Boshuizen et al[71]	1990	Tractor drivers	47% (point)
Magnusson et al[54]	1996	truck drivers	55% (point)
Magnusson et al[54]	1996	Bus drivers	65% (point)
Robb and Mansfield[58]	2007	Truck drivers	60% (1 yr)
Schwarze et al[58]	1998	Truck drivers	62% (point)
R. Chacko	2006 (unpublished thesis- Bangalore-India)	Bus drivers	56.0% (point)
This study	-	**Bus drivers**	**70.8 (10 yr)** **67.4% (1 yr)** **64.0% (point)**

Source: Compilation from various studies.

But most of these studies didn't have a comparison group of unexposed people. So finding prevalence with different tools will not give a complete picture of added risk due to driving occupation. This study tried to find out the added risk attributed to the driving occupation with a comparison group responding to same tool.

Driving occupation is found to be associated with LBP with OR 2.270 (1.471-3.502) in bivariate analysis whereas it was found to have OR 1.650 (1.025-2.657) in multivariate analysis, indicating driving occupation is associated with LBP and can be a risk factor for the same.

This study has also elaborated on the chronicity of LBP indicating chronic LBP (more than 12 weeks) is significantly high (73%) among drivers as compared to non-drivers (50.5%). This fact was also reflected in the period prevalence of LBP that comparatively fewer drivers are coming out of 10 years prevalence subset than that of non-drivers.(table-6)

Pain intensity of LBP is also significantly higher among drivers (table-9) as well as the duration of the current LBP is higher among the drivers (though statistically not significant).

Neck pain prevalence among drivers is 29.78% which is significantly higher compared to non-drivers with 19.57%. These findings are not very different from other similar studies abroad.

In this study job dissatisfaction OR=2.389 (1.065-5.361) was associated with LBP in bivariate analysis; and in multivariate analysis uncomfortable feeling at the start OR= 2.171 (1.142-4.125) and uncomfortable feeling at the end 2.228 (1.294-3.836) of work found out to be associated with LBP similar to a recent study by Chen JC et al with the

findings of association of LBP with self-perceived job stress (OR 1.75; 95% CI 1.20-2.55), job dissatisfaction (OR 1.44; 95% CI 1.05-1.98) among taxi drivers.[83]

4.5. Sequelae of LBP:-

Higher percentage of drivers (34.8%) went to hospitals for LBP compared to non-drivers (19%) with P value-0.001; higher percentage of drivers (36.5%) used medications for LBP compared to non-drivers (21.7%) in last year, P value=0.002; higher percentage of drivers (28.7%) took leave for LBP compared to non-drivers (15.8%) with P value= 0.003. All these findings indicated that the burden of LBP was not only affecting the quality of life but also the caused higher expenditure by drivers on medication and hospital visits.

If we observe the duration of leaves, it suggests that drivers were taking leaves lesser than non-drivers (table- 8). It was also true for maximum duration of leave and sum of duration of leaves; which was significantly higher for non-drivers. This can be explained by the fact that drivers were compelled not to take leaves and also there was a sense of assumed responsibility among drivers due to dependable nature of their job. Non-driver group was less in suffering as well lesser in going to hospitals but their leaves were much higher both in number and frequency.

In this study number of people with pain free interval and the frequency of pain free intervals is significantly less among drivers compared to non-drivers, suggesting poor recovery of LBP among drivers. So this variable points towards the possibility that driving occupation is not only a risk factor for occurrence of the LBP but also is a risk factor for retarding the recovery from LBP.

4.6. Strength:-

- So far there are very few prevalence studies for low back pain in different occupations with a comparison group.
- Very few efforts to find the association of some of the hypothesized risk factors for low back pain.
- This study clearly provides directions for future studies.

4.7. Limitations:-

- Sample size was taken to detect prevalence differences. This posed problem while establishing association of LBP with some of the risk factors.
- Years of experience is taken as a proxy variable expressing the effects of some of the risk factors which are difficult to measure for example vibration. But actual scientific measurement of these factors individually can give much clearer picture.
- Ideally a cohort study should have been done with two groups' follow-up, but due to limited time and economical constraints a cross sectional study is done.

4.8. Conclusion:-

The prevalence of chronic low back pain as well as neck pain is significantly higher among the bus drivers, indicating association between driving occupation and low back pain

Prevalence of most of the suspected risk factors is higher in drivers but this study fails to prove association between those suspected risk factors and LBP.

Tobacco consumption was not found to be associated with LBP or neck pain. Many hypotheses put forth claiming association between tobacco use and LBP. But in this study no association was found to support those hypotheses.

Feeling at the start and end of the work found to be associated with LBP both in bivariate and multivariate analysis suggesting that general health and psyche of the people has a role to play in the patho-physiology of LBP.

Drivers are seeking health care for LBP but they get less time for rest and recovery and their expenditure is also more due to LBP.

4.9. Recommendations:-

1. For future research to establish association or causation between some of the risk factors sample size has to be calculated differently for different risk factors. Simultaneously there is no reliable data on some of the risk factors like chewable tobacco. Plan considerably large sample size in those cases.
2. It needs multidisciplinary team to study factors like vibration and its effects. Also those variables need meticulous methods of measurements which are very costly.
3. There should be pre-selection examination and some component of health risks education for driving profession.
4. There should be a stringent system for continuous monitoring of the working environment of drivers including their seat conditions.
5. Special focus should be given on tobacco addiction among drivers and efforts should be put to avoid addiction after entering in this profession.
6. Drivers are at risk of other chronic diseases as well. Special focus should be given by the department on the issue of health of drivers. Health interventions are possible to implement as this is an organized setup.

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Appendix I

Consent form

Achutha Menon Centre for Health Science Studies
Sree Chitra Tirunal Institute for Medical Sciences & Technology,
Thiruvananthapuram, Kerala-695011

I am Dr. Abhijeet V. Jadhav, a student of Mater of Public Health (MPH) from Achutha Menon Centre for Health Science Studies (AMCHSS), Sree Chitra Tirunal Institute for Medical Sciences and Technology, Trivandrum. As part of my curriculum, I am conducting a study titled **"Prevalence of backache among bus drivers & associated modifiable risk factors in Latur ,Maharashtra"**, under the guidance of Prof **Dr. Kannan Srinivasan**. I would like to ask you some questions related to this study. There is no direct benefit from the study but public health programs as a whole may benefit.

During this process I will ask questions regarding work related practices & life style behaviors which are related to increased risk of chronic low back pain**.** This includes some questions on tobacco & alcohol use. It will not involve any invasive procedures like blood withdrawal. The whole procedure will take about 10-15 mins.

The information obtained from you will be kept confidential and will be used only for research purpose. You are free to withdraw from the interview at any point of time. Also you can refuse to answer any question without giving any explanations.

Are you willing to take part in the study?

Yes ☐ No ☐

If you are not willing to take part thank you for your time.

If you are willing please sign over here.

Signature of the responder: ----------

Signature of the investigator: ----------

Time: Date: Place:

Name/ ID NO-

In case you want to ask any information or doubts regarding my study you can contact on following numbers

Principal investigator:-

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Guide & co-investigator

Dr. Kannan Srinivasan,

Ph. No- 0471252443

Member secretary of the Institute

Ethics Committee at Sree Chitra Tirunal Institute

Dr.Anoopkumar Thekkuveetil

(mpb no:- 0471-2520256)

Appendix II

Questionnaire

Personal information

1. Name (optional) -
2. Age-
3. Occupation- driver ☐ other ☐
4. Contact no (optional) -

Work related information

5. How long you are working in this position- _____ years _____ months
6. In a normal working day how many hours do you work? _____ hours
7. On an average, how long do you sit in a single position at your place of work? _____ hours

(Non-drivers can go to question no. 13 directly)

Kindly encircle (©) the suitable answer in multiple choice response & tick (✓) **for Yes/No answers**

8. On an average what is the maximum duration of travel that you make at a single stretch? Please provide information for...

I. Last 1 year _____ hours/day
II. 5 years prior to this year _____ hours/day
III. 5 years prior to those 5 years _____ hours/day

9. Do you work in night shifts currently? Yes ☐ No ☐

10. If yes, please tell the number of night shifts in last month?

i. 1 to 4 **ii.** 5 to 10 **iii.** 11 to 20 **iv.** More than 20

11. How many times do you take rest/breaks in one day driving currently?

i. no breaks **ii.** 1 to 2 times **iii.** 3 to 4 times **iv.** 5 to 6 times **v.** More than 6 times

12. How do you spend time during breaks usually?

I. Lie down
II. Move/ walk around

III. sit
IV. stand

13. In a normal working day when you start the work, how do you feel?

i) very comfortable ii) comfortable iii) no opinion iv)uncomfortable v) very uncomfortable

14. At the end of a working day how do you feel?

i) very comfortable ii) comfortable iii) no opinion iv) uncomfortable v) very uncomfortable

15. How do you feel about your job?

i) Fully satisfied **ii)** moderately satisfied **iv)** not satisfied

Life style related questions

16. Do you consume any of the following? (You can **encircle** more than one option)

I. Cigarette
II. Beedi
III. Chewable Tobacco(e.g.- *guthkha*)
IV. I don't want to reveal

17. Kindly mention the quantity of above mentioned habits consumed per day.

I.	Cigarette	i) 1 to 5 ii) 6 to 10 iii) 11 to 20 iv) more than 20
II.	*Beedi*	i) 1 to 10 ii) 11 to 20 iii) 21 to 30 iv) more than 30
III.	Chewable Tobacco	i) 1-2 pouches ii) 3-4 pouches iii) more than 5 pouches

18. If you use any chewable form of tobacco then mention the average total duration you keep in your mouth.

i. Up to 10 min **ii.**11 to 30 min **iii.** 31 to 60 min **iv.** 1 to 2 hours **v.** More than 2 hours

19. When do you smoke or chew tobacco first in the morning?

i. within 5 min after getting up ii. 6 to 30 min after getting up iii. 31 to 60 min after getting up iv. 1 hour after getting up

20. Do you consume alcohol currently? Yes ☐ No ☐ I don't want to reveal ☐

21. If yes please specify the quantity consumed per week-_____ml (1 quarter= 180 ml)

22. Whether you do exercise regularly? Yes ☐ No ☐

23. if yes, how long you do exercise? _____ min

24. In a week, how many times you do exercise?

i. 1 to 2 times **ii.** 3-5 times **iii.** More than 5 times

25. What is the form of exercise? (Encircle the form of exercise you do)

I. Walking
II. Running
III. Muscle strengthening exercise at home
IV. Gymnasium
V. Outdoor games
VI. If others, please specify _____.

26. Do you require lifting heavy weights usually at places other than work-place? (eg at home/ farm)

Yes ☐ No ☐

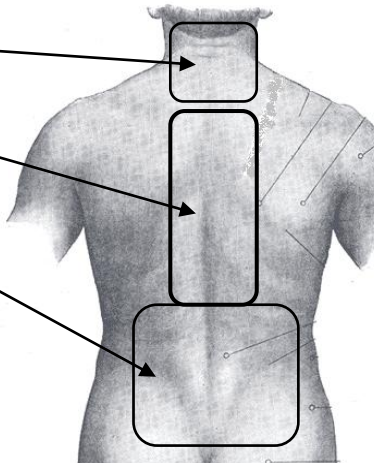
Backache related questions

27. Did you ever have any backache problem till date? Yes ☐ No ☐

<u>If "NO" please return the questionnaire</u>

28. Which part of your back ever had pain? (You can **encircle** more than 1 option)

I. Neck & just below neck
II. Middle part of the back
III. Lower part of back



29. When did you first notice that you have low back ache?_____Years_____ Months back.

30. Do you have lower back pain at present? Yes ☐ No ☐

31. Did you ever have low back pain in last 10 years? Yes ☐ No ☐

32. If yes, did you ever have low back pain in last 5 years? Yes ☐ No ☐

33. If yes, did you ever have lower back pain in last year? Yes ☐ No ☐

34. How much was the duration of your last low back pain episode?

I. Less than a week
II. 1 to 3 weeks
III. More than 3 weeks to less than 3 months
IV. More than 3 months

35. What are the usual features of your low back pain? (You can **encircle** more than 1 option)

I. Increasing over time
II. Decreasing over time
III. Static & no change with time
IV. Comes & goes in between
V. It only pains when i do physical work
VI. It pains when i stay in uncomfortable position for a while
VII. Other- _____.

36. Have you ever used any type of medicine for low back pain? Yes ☐ No ☐

37. Have you used any type of medication (tablets, massage oils etc) for low back pain in last year?

Yes ☐ No ☐

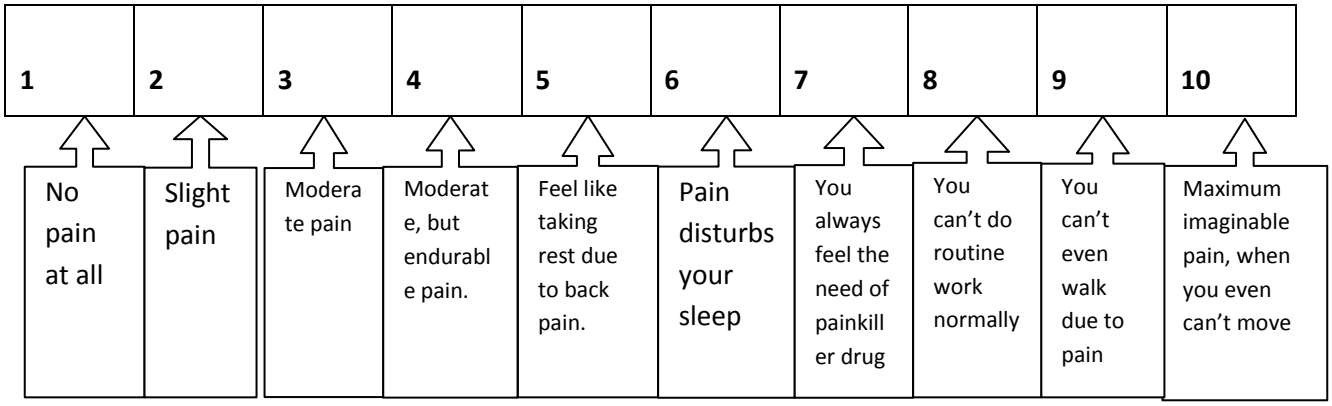
38. Did you seek help from any health care provider for lower back pain?

Yes ☐ No ☐

39. Whether you have ever been hospitalized due to low back pain? Yes ☐ No ☐

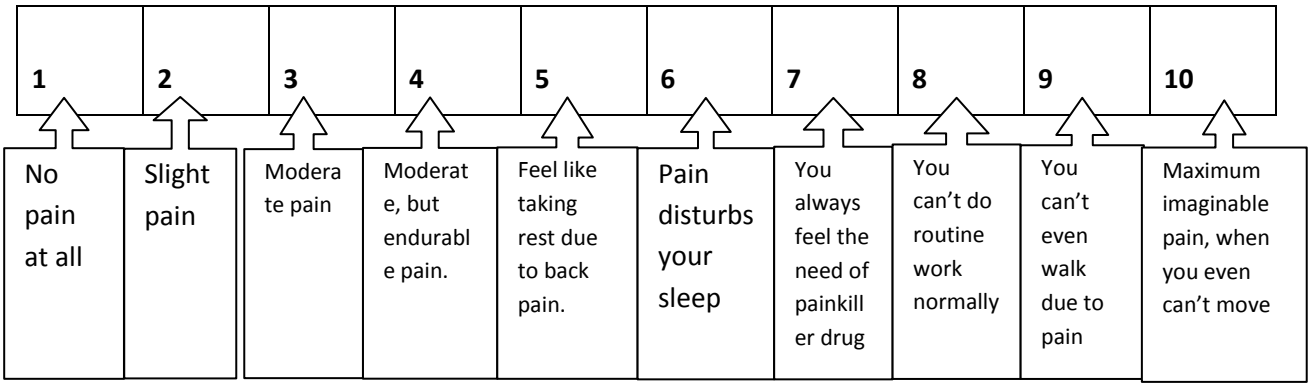
40. If yes, how long you were hospitalized _____.days

41. When you've under gone the worst possible low back pain ever, where would you place that back pain in the following scale? (Encircle one proper number which suits your pain.)



42. For how long you were in this state? _____ months

43. Where do you place your current low back pain status in the same scale?



44. Since how long you are in this state? _____Months

45. Have you ever felt like taking off for a while from the work due to low back pain?

Yes ☐ No ☐

46. Did you ever take leave from your work due to low back pain? Yes ☐ No ☐

47. If yes what was the duration of the leave in total? _____ Days

48. Was there any pain free period between the low back pain episodes, in last year?

Yes ☐ No ☐

49. If yes, then how many times did you experienced such pain free periods in last year?____.

50. What was the duration between last 2 episodes of low back pain? _____.