

# Study of Medical Morbidities among Bus Drivers of Maharashtra State Road Transport Corporation Division

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**Abstract:** Research question: what are the medical morbidities among bus drivers of Maharashtra State Road Transport Corporation division. Study setting: Four bus depots of the M.S.R.T.C. division of Nagpur. Study design: Cross-sectional study Duration-July 2015 up to December 2015. Methods: The interview technique was used as a tool for data collection. History taking & Detailed clinical examination included weight and height, measurement blood pressure (BP), random blood sugar level recording by using standard procedures and standardized instruments. Result: Total 400 bus drivers were studied. All were male. 248(62%) bus drivers were having musculoskeletal discomfort. Only 24 (6%) had elevated random blood sugar. Majority 205 (51.25%) study subjects were having hypertension. 103(25.75%) were pre-hypertensive. Prevalence of obesity was 27.25% (109 while 180 (45%) were having BMI within pre-obese category .Driving duration >20 years was significantly associated with musculoskeletal disorders ( $p<0.0001$ ), hypertension ( $p<0.0001$ ) and gastrointestinal disorders ( $p=0.0200$ ). Driving distance of >300 km was significantly associated with musculoskeletal disorders ( $p=0.0106$ ). Conclusion: Most common morbidity was musculoskeletal disorders, hypertension, gastrointestinal disorders, obesity and diabetes mellitus. Musculoskeletal discomfort was significantly related with duration of driving, daily driving distance (km).Hypertension was significantly related with duration of driving. Gastrointestinal disorders were significantly related with duration of driving.

**Keywords:** Bus drivers, Morbidity, Musculoskeletal disorder

## 1. Introduction

Every occupation carries its own risk and same is the case the bus driving. Driving frequently involves known risk factors such as ergonomic factors, whole body vibrations, prolonged sitting, twisting, bending and sometimes heavy weight lifting.<sup>(1)</sup>

The other risk factors include: a lack of decision making, social isolation, busy driving schedules, vehicle mechanical faults, reduced rest duration, poor cabin comfort, continually rotating shift patterns, adverse weather conditions, traffic congestion, sedentary nature of the job, noxious air from other vehicles, pressure of ensuring safety of passengers and demanding passengers. In terms of research interest, occupational health of bus drivers came in limelight by the seminal work published by Morris and colleagues in 1953<sup>(2)</sup> Which established the potentially noxious nature of professional bus driving, a fact which remains valid even today.

Very few studies in India have been conducted on health profile of bus drivers and their related workplace factors. With this background, a study was taken up on health profile of bus drivers of M.S.R.T.C and to study workplace stress among them.

## 2. Literature Survey

Ragaland DR *et al* (1997)<sup>(1)</sup> carried out cross sectional study among transit vehicle operators in San Francisco to

estimate the prevalence of hypertension. 2052 individuals were included in study. 1826 were actively working at time of examination. Participants were grouped according to years of driving in pre-employment, <10 yrs of driving, 10-20 yrs of driving, >20 yrs of driving. 65 (28.8%) of 226, 352 (31%) of 1137, 156 (31.7%) of 493, 76 (38.9%) of 196 participants in above groups respectively were found to be hypertensive. Morris JN *et al* (1966)<sup>(2)</sup> carried out prospective study in 687 busmen in London Transport Company to estimate the incidence of ischemic heart disease. Initial screening examination was carried out in 1960. The Ischemic heart disease was found among 20 (2.91%) busmen. Backman A (1983)<sup>(3)</sup> carried out a cross sectional study among a total of 633 male drivers from 35 enterprises in six different municipalities in Finland to investigate the health hazards of professional drivers. The participants included 165 local bus drivers, 122 long-distance bus drivers, 154 stock delivery drivers, 159 truck drivers, and 33 tank truck drivers. It was found that 443 (70%) drivers had suffered from pain in shoulder, back and neck, 127 (20%) drivers were found having hypertension, 272 (43%) drivers were having visual defects. 50 (8%) were suffering from gastric ulcer, 82 (13%) drivers were having a hearing defect, 272 (43%) drivers were having visual defects. Ragaland DR *et al* (1987)<sup>(4)</sup> carried out cross sectional study among 1500 bus drivers working in San Francisco to estimate the prevalence of hypertension. Study was carried out from August 1978 to December 1982. Blood pressure was taken on 3 different occasions and lowest level was recorded. It was found that 681 (45.4%) bus drivers were having hypertension. Netterstrom B, Juel K (1989)<sup>(5)</sup> carried out cross

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sectional study in 1978 among full time male bus drivers employed in the metropolitan traffic company, district 1 in Copenhagen, Odense city Traffic Company and Aarhus Tramway Company to know the prevalence of low back pain. Results showed that prevalence of low back pain in the age group of 25 – 44 years was found to be 52% (i.e. among 444 bus drivers) and in the age group of 45 – 64 years 61% (i.e. among 627 bus drivers). Overall 1071 (57%) bus drivers were having low back pain. Anderson R (1992)<sup>(6)</sup> done a cross sectional study among bus drivers of transit union of California. 128 bus drivers were included in the study by stratified random sampling. 103 (80.5%) bus drivers experienced pain in any part of spine. 65 (50.8%) were having cervical pain while lumbar pain was experienced by 85 (66.4%) bus drivers. Thoracic pain was present among 36 (28.1%) bus drivers. 60 (46.9%) were overweight, 60 (46.9%) were having normal weight, while 8 (6.3%) bus drivers were underweight. Bovenzi Metal (1992)<sup>(7)</sup> carried out a cross sectional study amongst 234 bus drivers at the municipal bus company of the city of Trieste, Italy in 1980. Standardized Nordic questionnaire was used to determine low back symptoms. Life time prevalence of low back pain was 36.3% while that in previous 12 months was 39.7%. Prevalence of low back pain in last 7 days was 62.4%. Prevalence of leg pain was found to be 32.5%. Lifetime prevalence of low back pain was highest, 46% of bus drivers between the age group of 26-35 years, followed by 36% in age group of 36-45 years, and 27% in the age group of 46-55 years. Jovanovi J et al (1997)<sup>(8)</sup> conducted cross sectional study among 900 drivers in Yugoslavia to estimate the prevalence of CHD risk factors. Interview technique was used for data collection. The mean age was found to be 51.8 ± 12.3 years. 222 (24.6%) drivers were found to be having arterial hypertension. 48 (5.3%) drivers were found to be having coronary heart disease. Regional Occupational Health Centre at Kolkata (2000)<sup>(9)</sup> carried out a study to assess the work environment and to identify the health hazards in transport workers including drivers, conductors and mechanics. They observed that pain and discomfort in various parts of the body (musculoskeletal problems) was reported by 71.4% of drivers. Hypertension was observed in 10.8% of drivers.

Wang PD *et al* (2001)<sup>(10)</sup> carried out cross sectional study among bus drivers and skilled workers who were employed full time by the Taipei Municipal Bus administrative Bureau (TMBAB) to determine the risk factors for coronary heart disease. Total 1761 bus drivers and 536 skilled workers were included in the study. Data collection was done from July 1998 to June 1999. Data analysis was restricted to male bus drivers only, because of the small number of female drivers. 168 (9.6%) bus drivers were obese (>30kg/m<sup>2</sup>) and 767 (43.6%) bus drivers were overweight (25-29.kg/m<sup>2</sup>) Hypertension was present among 986 (56%) bus drivers. Maximum, 68.5% hypertensive bus drivers were in the age group of 55-59 years followed by 50-54 years age group in which there were 58.3% hypertensive bus drivers. There was increasing trend of hypertension with the increase in the age. Diagnosis of ischemic heart disease was made with the help of ECG. 30 (1.7%) bus drivers were found to be having ischemic heart disease. Correa F *et al* (2002)<sup>(11)</sup>

conducted a cross sectional study among a probability random sample of 108 city bus drivers in city of Campinas, Brazil in 1991 to estimate the prevalence of occupational noise induced hearing loss and hypertension. 14 (13.2%) bus drivers were found to be hypertensive. Obelenis V *et al* (2003)<sup>(12)</sup> carried out cross sectional study during the period 2001-02 in 3 urban motor transport companies in Lithuania to analyze occupational, lifestyle and psychosocial factors of transport workers and assess their relation to their health. Data was collected from 788 participants with the help of questionnaire. Total 371 (47.1%) bus drivers were included in the study. Neck pain was complained by 42 (11.3%) drivers. Back pain was present among 95 (25.7%) drivers while 98 (26.4%) drivers were having waist pain. 81 (21.9%) bus drivers were found to be hypertensive. 64 (17.3%) drivers were suffering from gastrointestinal problems. Cough and bronchitis was present among 97 (26.1%) drivers. Ustinaviciene R *et al* (2004)<sup>(13)</sup> carried out a cross sectional study during 2001-2003 in 4 city enterprises of Lithuania including 2 bus enterprises, 1 trolleybus and 1 railway enterprise to evaluate the influence of changing occupational environment on workers health . 1000 employees were included in study but analysis was carried out among 788 employees. Other employees excluded due to non response. The prevalence of musculoskeletal morbidities was found to be 46.2%. 17.3% drivers were having alimentary complaints. 22.7% drivers were found to be having respiratory complaints. Tamrin S *et al* (2007)<sup>(14)</sup> conducted a cross sectional study from June 2004 until August 2005 to estimate the prevalence of musculoskeletal disorders in bus drivers. They studied 760 commercial vehicle drivers from 11 bus companies in central, northern and eastern regions of Malaysia participated in study. Standardized Nordic Questionnaire was used to determine the prevalence of low back pain. In the study, prevalence of low back pain was 60.4% followed by pain in neck 51.6%, pain in upper back 40.7%. Prevalence of pain in shoulder, knee, leg, hips, arm and elbow were 35.4%, 29.3%, 29.1%, 22.2%, 17.5% and 10.8% respectively. Okunribido O *et al* (2008)<sup>(15)</sup> carried out cross sectional study among various drivers, which included 68 bus drivers from city bus company, Aberdeen, U K to investigate role of vibration, posture and manual material handling as risk factor for LBP. Information was gathered with the interview technique. Bus drivers with more than 1 year duration at current job and more than 5 years of driving experience were included for analysis. The analysis was done among 61 bus drivers. In this study current low back pain was defined as low back pain in past 7 days and previous low back pain as pain in past 12 months. 32 (52.8%) bus drivers were having previous low back pain and 26 (42.1%) having current low back pain. Leg pain was present among 4 (5.3%) bus drivers. Raquel Pastr'ello Hirata *et al* (2012)<sup>(16)</sup> carried out a cross sectional study on 659 interstate bus drivers to characterize the population of professional bus drivers with regard to clinical and demographic variables, lipid profile and the presence of cardiovascular risk factors. Results showed that mean age of 41.7 years, weight of 81.4 kg, and BMI 27.2 Kg/m<sup>2</sup>; 38.2% of the sample was considered hypertensive and fasting glucose was above 100 mg/dL was found in 249 subjects (39.1%). Onawumi A.*et al* (2012)<sup>(17)</sup> carried out Cross

sectional study in four our urban centres in South western Nigeria including 1406 drivers to know the prevalence of work related musculoskeletal disorders among occupational taxicab drivers which showed that Prevalence of work related musculoskeletal disorders as neck (67%), right and left wrists (18%, 20%), upper, middle and lower back (29%, 29%, 30%), and buttock (19%). Gadekar RD (2012) <sup>(18)</sup> carried out cross sectional study among 287 bus drivers of Nanded bus depot to study the prevalence of abnormal glucose tolerance and associated risk factors in bus drivers. 7 (2.4%), 53 (18.5%), 150 (52.3%) and 77 (26.8%) bus drivers among 20-29yrs, 30-39yrs, 40-49yrs and >50yrs age group respectively were studied. 91 (31.7%) bus drivers were found to be overweight and 13 (4.5%) were found to be obese. 12 (4.2%) bus drivers were having impaired glucose tolerance and 30 (10.4%) were having diabetes mellitus.

**Methodology**

Ethical clearance from Institutional Ethics Committee of the college. The necessary permission to carry out the study was obtained from Divisional Controller, M.S.R.T.C. and his co-operation was sought. He was explained regarding the nature of study and requirement of place for medical examination of study participants. All depot managers co-operated for carrying out the study and for necessary arrangements to carry out physical examination and interviewing the study subjects. List of all bus drivers was obtained from depot managers of respective bus depots. A time schedule was prepared for the study participants, so that they could participate in the study conveniently without disturbing their duty pattern.

The pilot study was carried out on 100 study participants with predesigned proforma to check the feasibility and to test the proforma, necessary changes in proforma were made after pilot study. The interview technique was used as a tool for data collection. Data collection was done for the period of 4 months, during morning and afternoon hours, time which was convenient for the drivers. Data was collected from 5 - 6 study participants in a day. The interview and examination of the study subject used to last for an average of 35 to 45 minutes. Data was collected on all days of a week.

Interview and physical examination was carried out at room provided by depot manager of respective depots having provision of examination table and necessary space to carry out the study. Confidentiality of the study subjects were assured and maintained throughout the study. Before personal interview and physical examination, objective of the study was explained to participants and informed consent was taken. History taking included personal and socio-demographic details, occupational history, presenting complaints, past history, family history. Detailed clinical examination included weight and height measurement blood pressure (BP), random blood sugar level recording by using standard procedures and standardized instruments. Further required investigations and expert opinion was sought at our institution and medical advice was given to all the study subjects as per their morbidity status. Study subjects having any morbidities were prescribed appropriate treatment and if needed were asked to follow up in the out-patient department of our medical college and hospital.

**Statistical analysis**

Data analysis was done by using statistical software Microsoft office excel 2013, Graph pad prism version 5, Epi info 7.1.4, 2014. Descriptive analysis was done by using percentages. Workplace factors were analysed by using chi square test, t test, Z test with 95% confidence intervals value  $p < 0.05$  was taken as statistically significant.

**Study sample:** The prevalence of musculoskeletal discomfort in pilot study carried out amongst 100 study participants was found to be 50%. Prevalence (p)=0.50, Relative error (d)=10% i.e. 10% of p.  $Z(1-\alpha)=1.96$  for 95% confidence interval. Based on this prevalence, sample size was determined which come out to be 384. But it was decided to include all bus drivers working in four bus depots of the city. The present study included 400 bus drivers of the given division because of shift duties 100 bus drivers could not be contacted.

**3. Result and Discussion**

**Employment Characteristic**

**Table 1:** Distribution of bus drivers according to duration of current employment

Duration of Employment (in years)	No.	%
<10	86	21.5
20-Oct	106	26.5
21-30	208	52
Total	400	100

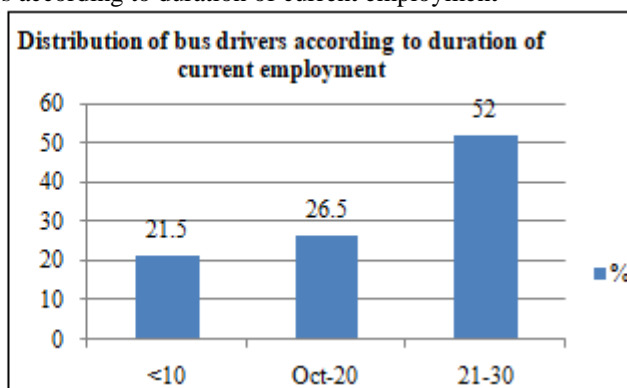


Table 1 shows distribution of bus drivers according to duration of current employment. 208 (52%) study subjects

were having duration of service above 20 years, 106 (26.5%) study subjects were having duration of

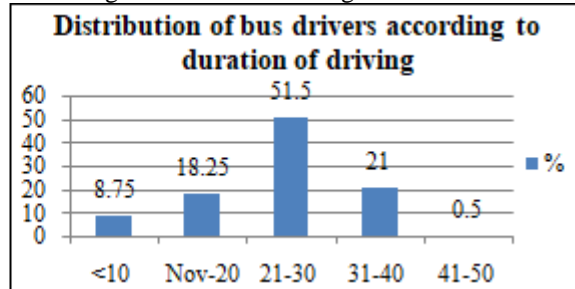
service between 10-20 years and 86 (21.5%) study subjects who were having duration of service less than 10 years. Mean years of duration of service was 19.01 years with standard deviation of 8.44 years and the range being 0.5-38

years. In the present study, mean duration of service was  $24.17 \pm 8.19$  years.

**Driving Duration**

**Table 2:** Distribution of bus drivers according to duration of driving

Duration of Driving* (in years)	No.	%
<10	35	8.75
20-Nov	73	18.25
21-30	206	51.5
31-40	84	21
41-50	2	0.5
Total	400	100



\*Duration of driving= Duration of Previous driving job + Duration of Current employment.

Table 2 shows distribution of bus drivers according to duration of driving .206 (51.5%) study subjects were having duration of driving between 21-30 years, 84 (21%) in between 31-40 years, 73(18.25%) between 11-20 years, 35(8.75%) less than 10 years and 2(0.5%) between 41-50 years. Mean years of duration of driving was 24.18

years with standard deviation of 8.19 years and the range being 0.5-41 years. In the present study, the daily duration of driving was 8 hrs. Which was according to the norms set under Motor Transport Workers Act, 1961 (48 hrs/wk). However higher daily driving duration was found in other studies carried out by Tamrin S *et al* (2007)<sup>(14)</sup> who found that average hours of driving per day was  $10.52 \pm 0.137$  hours.

**Table 3:** Distribution of bus drivers according to daily driving distance

Daily Driving Distance (in Km)	No.	%
<200	42	10.5
201-250	90	22.5
251-300	143	35.75
301-350	80	20
351-400	32	8
>400	13	3.25
Total	400	100

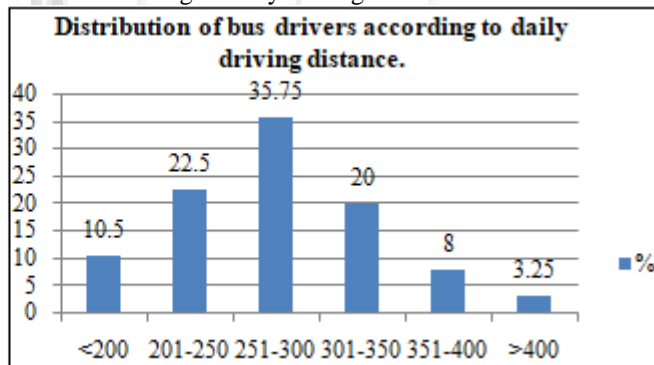


Table 3 shows distribution of bus drivers according to daily driving distance. 268(67%) study subjects were driving more than 250 kilometres per day. 143 (35.75%) study subjects were having daily driving of 251-300 kilometres. Study subjects with daily average driving of 301-350 kilometres were 80 (20%) and 32 (8%) were driving 351-400 km. Only 42 (10.5%) study subjects were driving less than 200 kilometres per day and only 13(3.25%) were driving more than 400 km per day. Mean daily average driving was 299.65 kilometres with standard deviation of 69.77 km and the range being 150-700 km.

**Working hours:**

In present study all the study subjects worked at least for 8 hours a day as per rules and regulations of MSRTC.

**Table 4:** Distribution of bus drivers according to system wise presenting complaints

System	Complaints	No.	%
Ocular	Irritation of eyes	15	3.75
	Redness of eyes	5	1.25
	Watering of eyes	29	7.25

Auditory	Decreased Vision	60	15
	Pterygium	9	2.25
	Tinnitus	2	0.5
Respiratory	Hearing Loss	13	3.25
	Cough	9	2.25
GIT	Breathlessness	29	7.25
	Acidity	120	30
	Constipation	80	20
	Abdominal Pain	4	1
Cardiovascular	Anorexia	2	0.5
	Palpitation	5	1.25
Nervous	Chest pain	38	9.5
	Tingling	53	13.25
	Numbness in Hand/Foot	59	14.75
	Headache	14	3.5
Musculoskeletal	Giddiness	5	1.25
	Neck pain	20	5
	Upper Back pain	24	6
	Lower Back pain	152	38
	Upper extremity pain	38	9.5
	Knee pain	99	24.75
	Legs & feet pain	49	12.25
Multiple Joint pain	1	0.25	
Other pains(Body)	11	2.75	

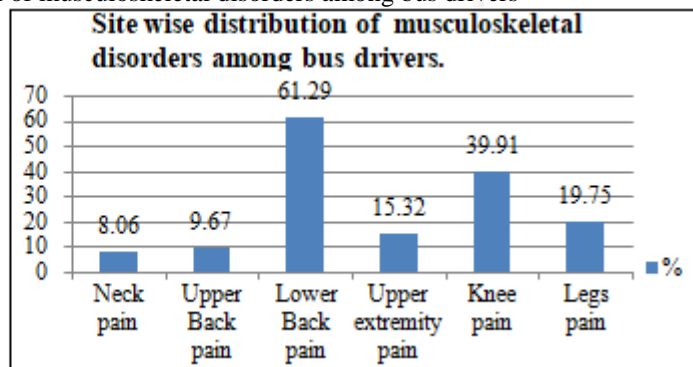
	ache/Chest/Thigh)		
Genitourinary	Burning in Micturition	2	0.5
	Difficulty in Micturition	4	1
	Renal calculi	3	0.75
	Piles	21	5.25
	Hernia /Hydrocele	12	3
Dental	Staining	37	9.25
	Toothache /Caries	5	1.25
Skin	Itching	6	1.5
	Psoriasis/Lichen Planus	2	0.5
Psychological	Irritability/Aggressive behavior	2	0.5
	Anxiety	4	1
	Forgetfulness	1	0.25
NASAL	Rhinitis	5	1.25
Others	Appendicitis/fever/lipoma/Burn/ Weakness/Wt Loss/ParotidPain/Pedal edema/Hypothyroidism etc.	30	7.5

Table 4 shows distribution of bus drivers according to system wise presenting complaints. In the musculoskeletal system, backache was the most common presenting complaint, present among 152 (38%) bus drivers followed by knee pain, which was present among 99 (24.75%) bus drivers. 62 (15.5%) bus drivers were suffering from the pain in upper extremity and upper back and 49 (12.25%) were suffering from pain in legs and feet. In the respiratory system, breathlessness was the most common presenting complaint, present among 29 (7.25%) bus drivers followed by cough which was present in 9 (2.25%). In the cardiovascular system, Chest pain was presenting complaint in 38 (9.5%) study subjects. Palpitations were present in 5(1.25%) of bus

drivers. In Gastrointestinal complaints, Heartburn was present in 120(30%) bus drivers. Constipation was present in 80 (20%) study subjects Pain in abdomen was present among 4 (1.0%) bus drivers and Anorexia was present in 2 (0.5%) bus drivers. Among ocular complaints, most common presenting complaint was Diminution of vision was complained by 60 (15%) study subjects, watering of the eyes was complained by 29 (7.25%) study subjects. and irritation of the eyes was the presenting complaint of 15 (3.75%) study subjects. Redness of eyes was complained by 5 (1.25%) bus drivers. Decreased hearing was the complaint of 13 (3.25%) study subjects and tinnitus was present among 2 (0.5%) study subject. In genitourinary system, Burning micturition was present in 2(0.50%) study subjects. Difficulty of micturition was complained by 4 (1%) study subjects. Piles was present on 21(5.25%) and swelling in groin was present in 12 (3%) of bus drivers. In nervous system, Tingling was present in 53(13.25%) study subjects. Numbness of hand and feet was present in 59 (14.75%) study subjects and headache was present among 14 (3.5%) study subjects and giddiness was present in 5 (1.25%) bus drivers. Itching was the presenting complaint in 6 (1.5%) study subjects and Psoriasis and lichen planus was present in 1 (0.25%) bus drivers each. Among psychological complaints, Anxiety was complained by 4 (1%). Irritability and Aggressive behaviour by 2 (0.5%) and forgetfulness was complained by 1 (0.25%) bus drivers. Rhinitis was present in 5 (1.25%) bus drivers. Dental staining was present in 37 (9.25%) of bus drivers while caries were present in 5 (1.25%) of bus drivers.

**Table 5: Site wise distribution of musculoskeletal disorders among bus drivers**

Site	No.(n= 248*)	%
Neck pain	20	8.06
Upper Back pain	24	9.67
Lower Back pain	152	61.29
Upper extremity pain	38	15.32
Knee pain	99	39.91
Legs pain	49	19.75



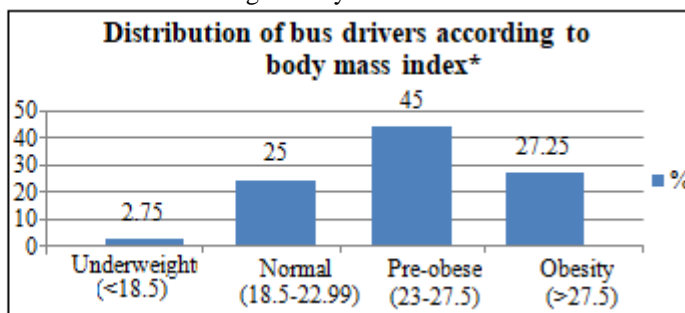
\* Those having Musculoskeletal Disorders

Table 5 shows site wise distribution of musculoskeletal disorders among bus drivers. Total 248 study subjects were having musculoskeletal discomfort. Out of them 152 (61.29%) were having musculoskeletal discomfort in lower back followed by 99 (39.91%) study subjects were

having musculoskeletal discomfort in knee. 49 (19.75%) had legs pain . 38 (15.32%) and 24 (9.67%) had musculoskeletal discomfort in upper extremity and upper back respectively. 20 (8.06%) study subjects in neck.

**Table 6:** Distribution of bus drivers according to body mass index\*

Body Mass Index (Kg/m <sup>2</sup> )*	No.	%
Underweight(<18.5)	11	2.75
Normal(18.5-22.99)	100	25
Preobese (23-27.5)	180	45
Obesity(>27.5)	109	27.25
Total	400	100



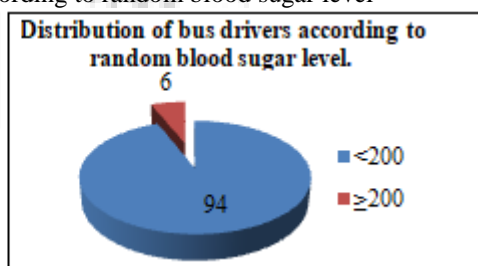
\*Grades of obesity for Asians

Table 06 shows distribution of bus drivers according to body mass index. 180 (45%) study subjects were found to be having BMI in the range of 23.0 – 27.5 kg/m<sup>2</sup> followed by 109 (27.25%) having BMI of >27.5 kg/m<sup>2</sup>. 100 (25%) and 11 (2.75%) had their BMI in the range of 18.5-22.99 kg/m<sup>2</sup> and <18.5 kg/m<sup>2</sup> respectively. Mean BMI was found to be 25.24 ± 3.9 kg/m<sup>2</sup> with the range being 16.33 - 37.63 kg/m<sup>2</sup> is in accordance with Raquel Hirata

*et al* (2012) <sup>(16)</sup> where prevalence of overweight was 55.6% and obesity was 19.6%, Wang PD *et al* (2001) <sup>(10)</sup> where 9.6% bus drivers were obese (>30kg/m<sup>2</sup>) and 43.6% bus drivers were overweight (25- 29.9 kg/m<sup>2</sup>), Anderson R (1992) <sup>(6)</sup> where 46.9% bus drivers were overweight but differs from Gadekar RD (2012) <sup>(18)</sup> where 31.7% bus drivers were overweight and 4.5% bus drivers were found to be obese.

**Table 7:** Distribution of bus drivers according to random blood sugar level

Random Blood Sugar (mg/dl)	No.	%
<200	376	94
≥200	24	6
Total	400	100



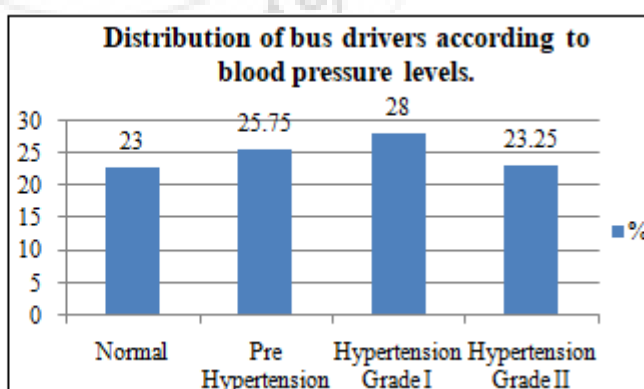
American Diabetic Association criteria

Table 07 shows distribution of bus drivers according to random blood sugar level. 24 (6%) had elevated random blood sugar level ≥200 mg/dl at the time of examination. Remaining 376 (94%) had normal blood sugar level <200

mg/dl. similar to the findings Gadekar RD (2012) <sup>(18)</sup> where the prevalence was 10.4% but differs from Raquel Hirata *et al* (2012) <sup>(16)</sup> where prevalence was 2.8%

**Table 8:** Distribution of bus drivers according to blood pressure levels

Blood Pressure (mm/Hg)	No.	%
Normal	92	23
Pre Hypertension	103	25.75
Hypertension Grade I	112	28
Hypertension Grade II	93	23.25
Total	400	100



JNC- 7 criteria

Table 08 shows distribution of bus drivers according to blood pressure levels. Total 205 (51.25%) study subjects were having hypertension. 103(25.75%) were pre-hypertensive and 92(23%) were normotensive. in accordance with Wang PD *et al* (2003) <sup>(10)</sup> where hypertension was present among 56% bus drivers but

differs from Raquel Hirata *et al* (2012) <sup>(16)</sup> where prevalence of hypertension was 38.2%, Obelenis V *et al* (2003) <sup>(12)</sup> where the prevalence of hypertension was 21.9%, Correa F *et al* (2002) <sup>(11)</sup> found prevalence of hypertension as 13.2%, Regional Occupational Health Centre at Kolkata (2000) <sup>(9)</sup> where the Prevalence of hypertension was found to be 10.8%, Jovanovi J *et al* (1997) <sup>(8)</sup> where the prevalence of hypertension was 24.6%,

Backman A (1983) <sup>(3)</sup> where the prevalence of hypertension was 20%, Ragaland DR *et al* (1987) <sup>(4)</sup> where the prevalence of hypertension was 45.4%.

**Table 9:** Distribution of bus drivers according to duration of driving and morbid conditions\*

Driving Distance (in years)	No.	MSD n (%)	HTN n (%)	DM n (%)	GIT n (%)
<20	108	49 (45.37)	36 (33.33)	3 (2.78)	28 (25.93)
>20	292	199 (68.15)	169 (57.88)	21 (7.19)	46 (15.75)
Total	400	248	205	24	74
$\chi^2$		17.37	19.01	2.724	5.411
p value		<0.0001	<0.0001	0.1521	0.02

Table 09 shows association of duration of driving with various morbidities- it shows that driving duration >20 years was significantly associated with musculoskeletal disorders (p<0.0001), hypertension (p<0.0001) and gastrointestinal disorders (p -0.0200), while it was not associated with diabetes. In the present study musculoskeletal discomfort was found to be significantly related with duration of driving, daily driving distance (km). This was in accordance with Tamrin S *et al* (2007) <sup>(14)</sup> where length of employment to be statistically significantly related to low back pain (p < 0.05), Anderson R (1992) <sup>(6)</sup> they found significant relationship between length of time in job and back pain (p < 0.05) Prevalence of Hypertension was higher as compared to most other studies, reason could be the aggregation of study subjects in the higher age groups and more driving duration as observed in study (p<0.001). This is in accordance with Ragaland DR *et al* (1997) <sup>(1)</sup> where found prevalence of hypertension as 35.54% with highest, 38.9% prevalence among the study subjects with experience of >20 years of driving.

**Table 10:** Distribution of bus drivers according to daily driving distance and morbid conditions

Driving Distance (in Km)	No.	MSD n (%)	HTN n (%)	DM n (%)	GIT n (%)
<300	275	182 (66.18)	147 (53.45)	20 (7.27)	49 (17.82)
>300	125	66 (52.8)	58 (21.09)	4 (1.45)	25 (9.09)
Total	400	248	205	24	74
$\chi^2$		6.532	1.712	2.527	0.2713
p value		0.0106	0.1908	0.1119	0.6024

Table 10 shows association of daily driving distance with various morbidities- it shows that driving distance of >300 km was significantly associated with musculoskeletal disorders (p=0.0106) while it was not associated with gastrointestinal disorders, diabetes and hypertension. Table also shows that proportion of MSD was more in group of bus drivers driving <300 km per day because senior bus drivers were allotted shorter jobs because of their age and younger drivers were sent on longer duties.

#### 4. Conclusion

1) Most common morbidity was musculoskeletal disorders, hypertension, gastrointestinal disorders, obesity and

diabetes mellitus. Musculoskeletal discomfort was significantly related with duration of driving, daily driving distance (km).

2) Hypertension was significantly related with duration of driving. 3) Gastrointestinal disorders were significantly related with duration of driving.

#### 5. Future Scope

- 1) Effect of occupational exposure can be better assessed by comparing with unexposed group. Such comparison group was not taken this study.
- 2) Variability of exposure of occupational factors.
- 3) Healthy Worker Effect-which is the mortality advantage of workers in employment relative to the general population (which also comprise diseased, non-working individuals with a higher risk of mortality). Healthy worker effect could be minimised by taking comparison group. Such comparison group was not taken this study.

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