



Low Back Pain and Subsequent Disc Degeneration: An Epidemiological Survey

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ABSTRACT

Low back pain (LBP) is a global health problem. The cause of LBP is not known, but it is the intervertebral disc (IVD) and the age related degenerative changes that occur within it that have been most frequently associated with LBP. Activities involving bending, twisting, heavy lifting, static posture and psychological stress are factors that predispose to back injuries. This paper is a report of a study conducted to survey the prevalence of risk factors for LBP amongst a cross-section of 285 individuals including students, housewives, working and retired people. Data was collected and statistically analyzed. Middle aged population had more complaints of LBP than the younger age group. The parameters like height, weight and gender are not an attribute that is related to LBP. The intensity of pain was severe in 16.75% and 59% feel the pain during working hours; highest prevalence was reported by population that had long sitting hours (62%) ; next by people who travel for work (51%). Interference of LBP in daily activities was reported in 66%; 8% reported family history of LBP; 15% felt injury was the cause of LBP. The prevalence of risk factor of LBP associated with Disc Degeneration was about 22%. The results indicate that preventive measures should be taken to reduce the risk of lower back pain, such as rest periods, exercise regimes and ergonomically designed furniture that suits the occupation. The study has to be extended to more subjects and then can be correlated to physical/psychological stress.

Key words: Disc degeneration, Ergonomic, Low back pain (LBP), Occupation, Stress.

INTRODUCTION

Low back pain is a very common health problem worldwide and a major cause of disability - affecting performance at work and general well-being. Low back pain can be acute, sub-acute, or chronic. Though several risk factors have been identified (including occupational posture, depressive moods, obesity, body height and age), the causes of the

onset of low back pain remain obscure and diagnosis difficult. Back pain is not a disease but a constellation of symptoms. In most cases, the origins remain unknown.

Low back pain affects people of all ages, from children to the elderly, and is a very frequent reason for medical consultations. The 2010 Global Burden of Disease Study estimated that low back pain is among the top 10 diseases (1). It is difficult to estimate the incidence of low back pain as the incidence of first-ever episodes of low back pain is already high by early adulthood and symptoms tend to recur over time. The lifetime prevalence of non-specific low back pain is estimated at 60% to 70% in industrialized countries (one-year prevalence 15% to 45%, adult incidence 5% per year). The prevalence rate for children and adolescents is lower than that seen in adults but is rising (2,3). Prevalence increases and peaks between the ages of 35 and 55 (4). As the world population ages, low back pain will increase substantially due to the deterioration of the intervertebral discs in older people. Low back pain is the leading cause of activity limitation and work absence throughout much of the world, imposing a high economic burden on individuals, families, communities, industry, and governments (4). In the United Kingdom, low back pain was identified as the most common cause of disability in young adults, with more than 100 million workdays lost per year(5) . In Sweden, a survey suggested that low back pain accounted for a quadrupling of the number of work days lost from 7 million in 1980 to 28 million by 1987. In the United States, an estimated 149 million work days are lost every year because of low back pain,(6) with total costs estimated to be US\$ 100 to 200 billion a year (of which two-thirds is due to lost wages and lower productivity)(7,8) .At present low back pain is treated mainly with analgesics. The causes of lower back pain are rarely addressed. Alternative treatments include physical therapy, rehabilitation and spinal manipulation.

The cause of LBP is not known, but it is the intervertebral disc (IVD) and the age related degenerative changes leading to prolapsed, that occur within it that have been most frequently associated with LBP(9). This prolapsed disc causes impairment of function by nerve root compression compelling the patient to seek medical advice for low backache. The problem of prolapsed intervertebral disc is of great importance in India, because of the fact that people here are subjected to various physical stress either due to their occupational habits, low socioeconomic status or are subjected to live, work at places with poor infrastructure. Work activities involving bending, twisting, frequent heavy lifting, awkward static posture and psychological stress are regarded as factors for predisposition to back injuries. The volume of intervertebral tissue decreases with degeneration and it has been shown that failure of the human lumbar intervertebral disc occur most often in the part of spine that is subjected to heaviest mechanical stress (10, 11,12). However, the most commonly identified risk factor associated with lumbar disc herniation includes young age, male gender, familial association, environmental factor, trauma and cigarette smoking (13). Disc surgery remains the last option when all other strategies have failed, but the outcomes are disappointing (14, 15).

This is a study conducted to survey the prevalence and risk factors for lower back pain amongst a cross-section of individuals including students, housewives, working and retired people in and around Delhi.

METHODOLOGY

A well designed questionnaire was completed by 285 individuals. Data were collected over a period of eight months and statistically analyzed by using Chi square variations. We used chi square distribution plot techniques to come to the conclusion whether a given attribute is associated with having back pain or not.

The chi-squared distribution (also chi-square or χ^2 -distribution) with k degrees of freedom is the distribution of a sum of the squares of k independent standard normal random variables¹⁵. The chi-squared distribution is used in the common chi-squared tests for goodness of fit of an observed distribution to a theoretical one. This is usually denoted as

$$Q \sim \chi^2(k) \text{ or } Q \sim \chi_k^2.$$

The chi-squared distribution has one parameter: k — a positive integer that specifies the number of degrees of freedom (df)

RESULTS

Two hundred and eight five respondents (36%) males and (64%) females participated in the study. LBP was more prevalent among females (76%) than the males (63%).The Chi square distribution plot showed that though prevelant in females Gender as such was not an attribute to Low back pain(Table 1 and Fig 1).

Table1-Gender wise distribution of LBP

	Males	Females	Total
Have Back Pain	42	90	132
No Back Pain	24	29	53
Total	66	119	185

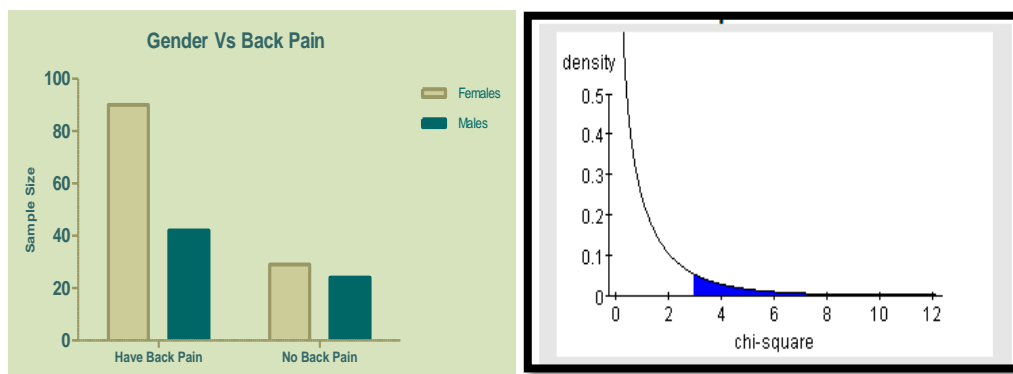


Fig1Chi square distribution graph for gender attribute with Low back pain with df-1 and chi square-2.988

Middle aged population had more complaints of Low back pain than the younger age group below with a percentage of 51%. The chi square distribution plot is statistically significant with $df=4$ and Chi Square of 9.818. This shows that age is an attribute that is related to LBP (table 2 and Fig 2,3,4)

Table2-Age/Gender wise distribution of LBP

FEMALE			MALE		
Age	Has back pain	No back pain	Age	Has back pain	No back pain
Below 20	22	11	Below 20	6	7
20-30	25	11	20-30	10	13
30-45	31	7	30-45	9	6
45-60	18	9	45-60	19	5
60 above	10	1	60 above	4	3
	mean:	25.02		mean:	22.62
	variance:	504.43		variance:	585.89
	SD	22.46		SD	24.21

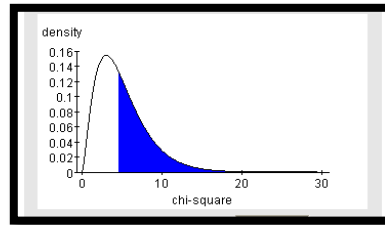
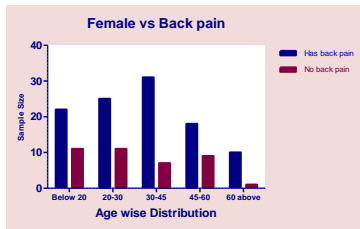


Fig-2 Chi square distribution graph for age wise distribution of LBP vs female population with $df=5$ and chi square-4.671

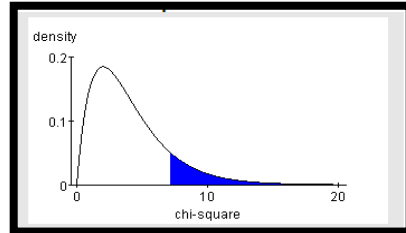
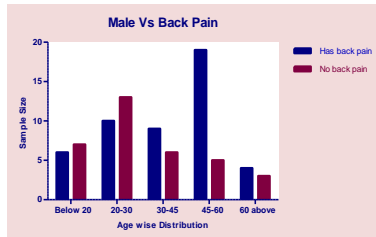


Fig-3 Chi square distribution graph for age wise distribution of LBP vs Male population with $df=4$ and chi square-7.197

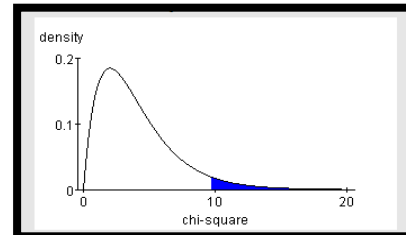
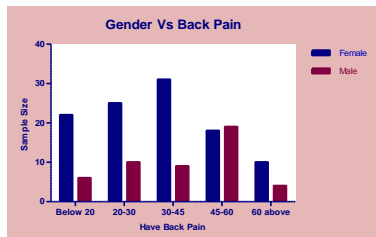


Fig-4 Chi square distribution graph for age wise distribution of LBP vs Male Population with $df=4$ and chi square-9.818.

Table 3 and Fig 5 shows the relation between height and incidence of LBP. The chi square distribution plot is not statistically significant with df-5 and Chi Square of 1.763. This shows that height is not an attribute that is related to Low back pain.

Table3-Height vs LBP

Height(cms)	Have back pain	No back pain
140-150	5	4
150-160	39	15
160-170	32	13
170-180	21	7
180-190	3	1
190-200	1	1

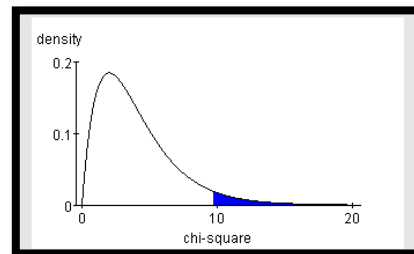
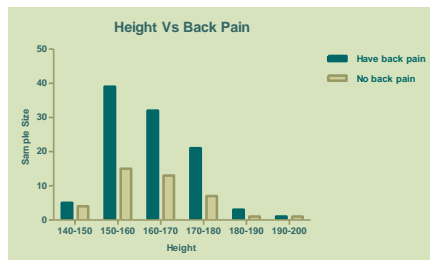


Fig-5 Chi square distribution graph for Height vs LBP with df-5 and chi square-1.763

Table 4 and Fig 6 shows the relation between weight and incidence of LBP. The chi square distribution plot is not statistically significant with df-5 and Chi Square of 2.501. This shows that Weight is also an attribute that is not related to Low back pain.

Table4-Weight vs LBP

Weight(kgs)	Have back pain	No back pain
40-50	13	4
50-60	29	9
60-70	40	15
70-80	25	10
80-90	13	7
90-100	4	0

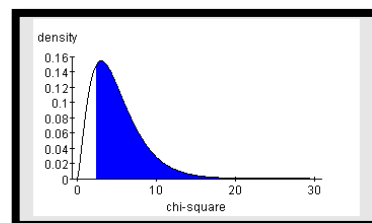
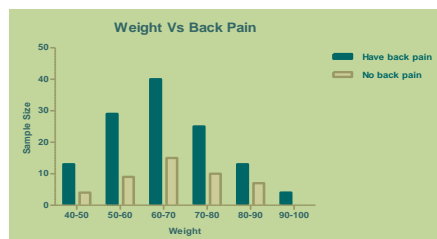


Fig-6 Chi square distribution graph for Weight vs LBP with df-5 and chi square-2.501

The Episodes of Low back pain was 56.76% occasionally experienced and about 10.27% always in the prevalent population. The intensity of pain was also severe in 16.75% of the population studied (Table 5, Fig 7).

Table 5- Episodes and Intensity of Back Pain

<u>Episodes of Back pain</u>		Intensity	
Never	61	No	53
Occasionally	105	Very mild	14
Always	19	Mild	45
		Moderate	28
		Severe	30
		Very severe	9

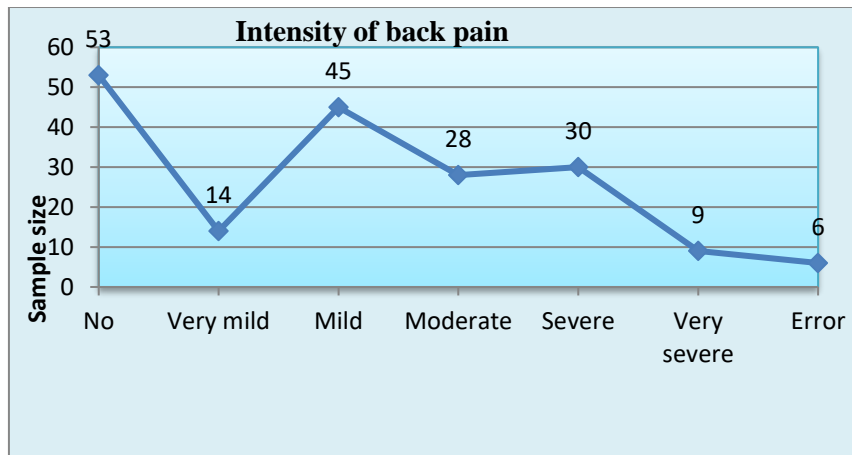
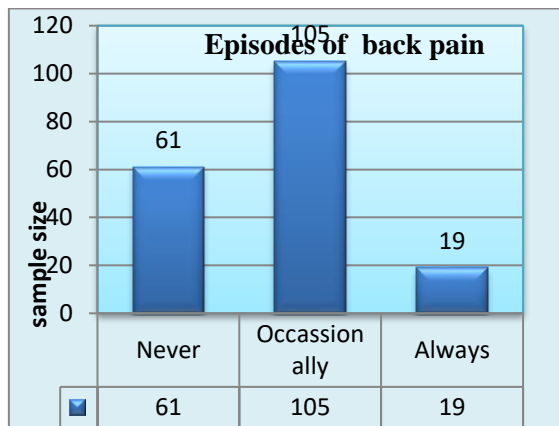


Fig-7 Graph showing the Intensity of pain in the population StudiedThe highest prevalence of LBP was reported by students (69%) and employed population about (59%) of them feel the pain during working hours. The chi square distribution plot is not statistically significant with df-5and Chi Square of 8.875 .This shows that Employment status is also not an attribute that is related to Low back pain (Table 6 and Fig 8).

Table-6 Employment Vs LBP

Employment	Have back pain	No back pain
Working	42	25
Housewife	38	10
Unemployed	1	0
Student	40	18
Retired(not due to health)	8	0
Retired(due to health)	3	0

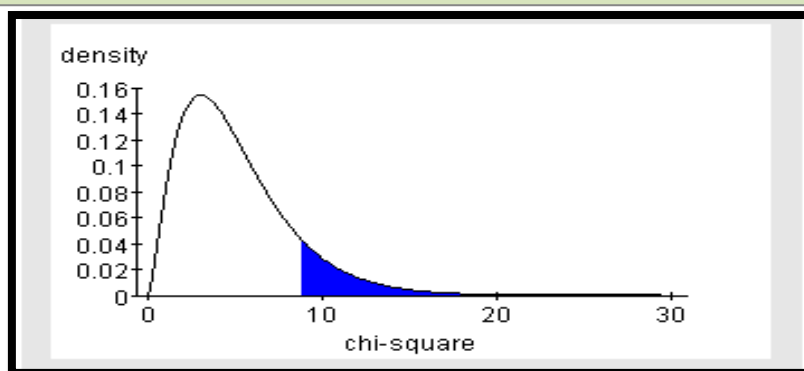
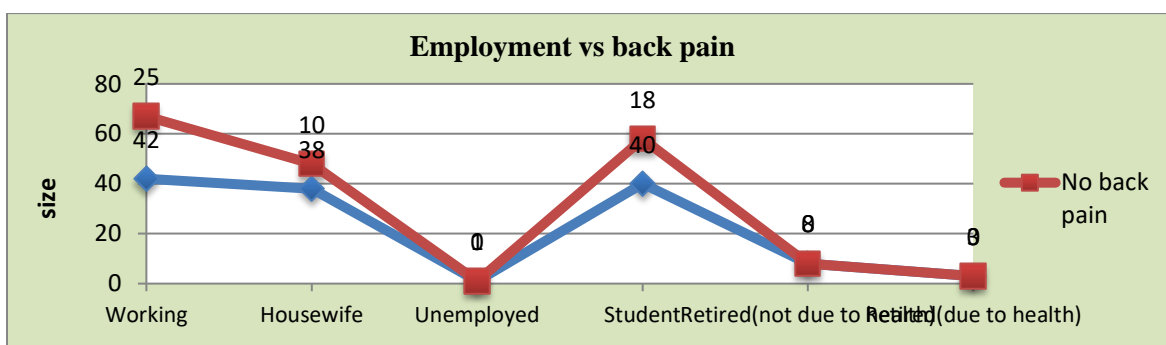


Fig-8 Chi square distribution graph for Employment vs LBP with $df=5$ and $chi\ square=8.875$

The highest prevalence of LBP was reported by population that had long sitting hours of working condition (62%) and next by people who travel a lot about (51%). The chi square distribution plot is statistically significant with $df=2$ and Chi Square of 2.393. This shows that working conditions are an important attribute that is related to Low back pain (Table 7, Fig 9).

Table-7 Working Condition Vs LBP

Working Condition	Have back pain	No back pain
Sit long hrs	62	14
Lift loads	14	4
Travel a lot	51	21

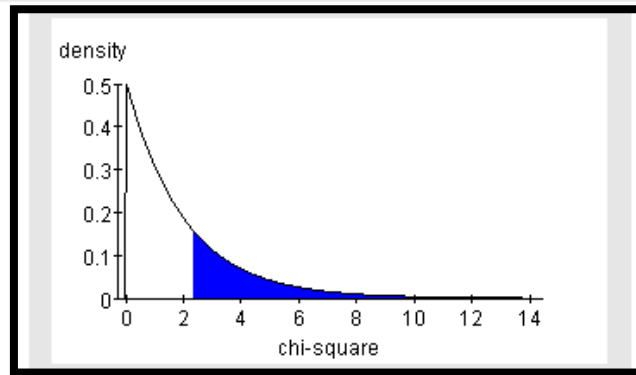
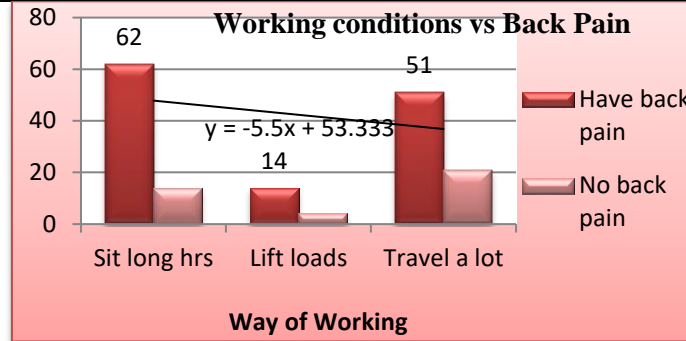


Fig-9 Chi square distribution graph for working conditions vs LBP with df-2 and chi square-2.393

Interference of low back pain in daily activities especially during work has been reported in almost 66% of the prevalent population. The chi square data's are statistically significant (Table 8 and Fig 10)

Table-8 Interference of pain in daily activities

Interference of pain in daily activities		
	Yes	no
Walking	11	174
Sleeping	30	155
Work	108	77

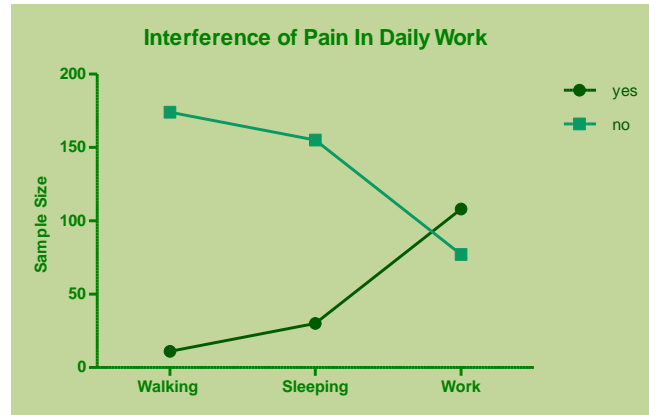


Fig-10 Graph for Interference of pain in Daily work

Among the population studied about 8% have family history of LBP and about 15% feel injury is cause of LBP (Fig 11)

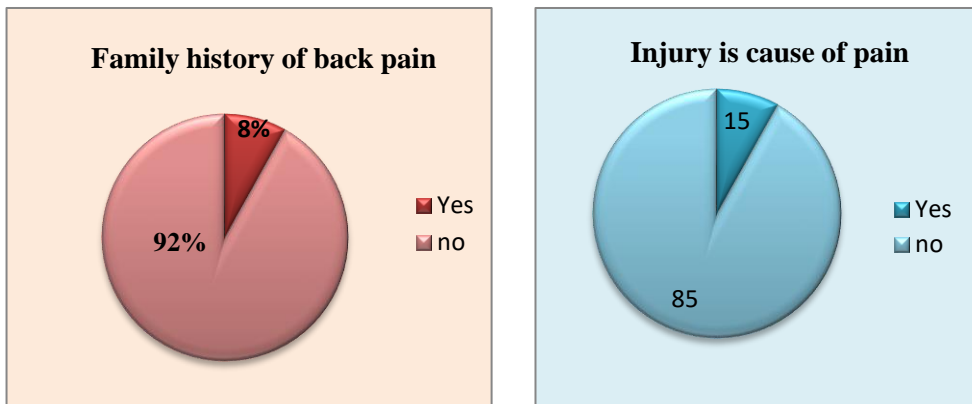


Fig-11 Pi Graph showing the prevalence of Family history of low back pain

Generally people prefer taking rest or applying heat as the best cure for LBP others take medicines, try yoga, massage or some spray or gel. In case the situation goes worse 86(47%) will try and manage on their own whereas 68(37%) will consult a doctor, a practitioner or a physiotherapist. In the sample 60(45%) of them feel that treatment has provided a lot of relief whereas 20(16%) of them did not feel any betterment in their condition (Table 9, Fig12)

Table-9 Pain management for LBP

What do you do when pain is worst	Count
Self manage	86
Consult a physiotherapist	14
Consult a doctor	43
Consult a practitioner	11

What makes pain better	Count
Heat	40
Rest	84
Medicines	49
Yoga	1
Exercise	2
Sprays & Gel	14
Massage	7

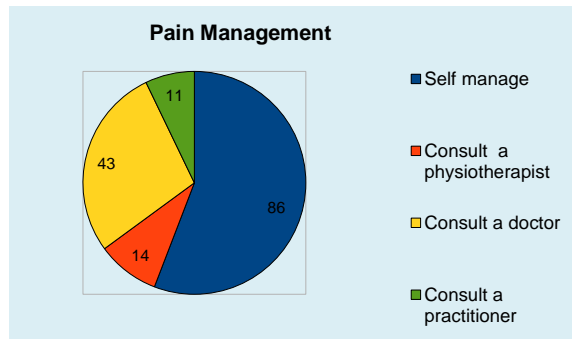


Fig-12. Graph plots showing various methods of Pain Managements

The prevalence of risk factor of LBP associated with Disc Degeneration is about 22% which is a large proportion of the population. This is also a factor that determines the importance of early treatment for LBP which if neglected can become a risk factor for severe degenerative disorders related to spinal cord (Fig 13).

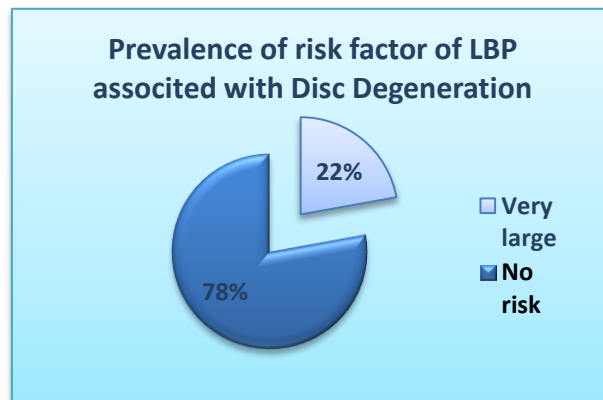


Fig-13 Pi Graph showing the prevalence of Risk Factor associated with LBP

DISCUSSION

Low back pain (LBP) is a global health problem leading to a considerable loss of working days and impacting significantly on the National Health Service. The cause of LBP is not known, but it is the intervertebral disc (IVD) and the age related degenerative changes that occur within it that have been most frequently associated with LBP. Work activities involving bending, twisting, frequent heavy lifting, awkward static posture and psychological stress are regarded as factors for predisposition to back injuries. This paper is a report of a study conducted to survey the prevalence and risk factors for lower back pain amongst a cross-section of individuals including students, housewives, working and retired people. Two hundred and eight five respondents (36%) males and (64%) females participated in the study. LBP was more prevalent among females (76%) than the males (63%). The Chi square distribution plot showed that though prevalent in females, gender as such was not an attribute to Low back pain. Middle aged population had more complaints of Low back pain than the younger age group with a prevalence rate of 51%. The chi square distribution plot is statistically significant with df-4 and Chi Square of 9.818. This shows that age is an attribute that is related to LBP. The chi square distribution plot was not statistically significant for both height and weight. 1.763.

The highest prevalence of LBP was reported by population that had long sitting hours of working condition (62%) and next by people who travel a lot about (51%). The chi square distribution plot is statistically significant with df-2 and Chi Square of 2.393. This shows that working conditions are an important attribute that is related to Low back pain. Interference of low back pain in daily activities especially during work has been reported in almost 66% of the prevalent population. The chi square data's are statistically significant. Among the population studied about 8% have family history of LBP. The prevalence of risk factor of LBP associated with Disc Degeneration is about 22% which is a large proportion of the population.

CONCLUSIONS

The study shows that working conditions particularly sitting postures and poor travel conditions during work is the primary cause of Low Back pain particularly in the older populations with no bias in any gender. The progression of LBP to disc degeneration in a significant % of the population surveyed shows that LBP needs to be addressed in the early stages. This is also a factor that determines the importance of early treatment for LBP which if neglected can become a risk factor for severe degenerative disorders related to spinal cord. The results indicate that preventive measures should be taken to reduce the risk of lower back pain, such as rest periods, exercise regimes and ergonomically designed furniture that suits the occupation. The study has to be extended to more subjects and then can be correlated to physical/psychological stress.

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