

## THE PREVALENCE OF LOW BACK PAIN ON PATIENTS' RADIOLOGICAL REPORTS

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### ABSTRACT

**Background:** Low back pain is a pain felt at the lower dorsal part of the body and it is associated with increase in age of an individual. LBP has also been linked to several disorders of structures like ligaments, facet joint, vertebral periosteum, intervertebral disc, fascia and spinal nerve roots. Fractures, muscle spasms, and pressure on a weakened disc could also lead to LBP. It affects both men and women but prevalence is higher in women than men.

**Aim:** The aim of the study was to determine the prevalence of Low Back Pain on patients' radiological reports in a Radiology department of a Teaching Hospital in Ghana.

**Methods:** A quantitative and cross-sectional study design was used with a framework for the design based on radiological reports recorded. Convenient sampling was used to select 540 radiological reports of patients who were 18 years and above. Data was analyzed using SPSS version 18.0. Descriptive statistics of frequency distributions, bar charts and percentages were used to present the data collected.

**Results:** Females had a higher prevalence of 56% while males had 44% of the total population. The causes of LBP were categorised into Non Specific Cause, Nerve Root Affection and Possible Underlying Pathologies. Spondylosis which was a Non Specific Causes, was prevalent among all the other causes and was prevalent almost all the age groups. No pathologies were seen in 28.4% of patients who had Plain x-rays.

**Conclusion:** LBP was found to affect both men and women but more prevalent in women than men. Non Specific Cause of LBP was the prevalent cause and Spondylosis was most prevalent among the Non Specific Cause. It was also prevalent in all the age groups and in both sexes. MRI and PMCT appeared to be more diagnostic compared to Plain x-rays.

**Keywords:** Osteophytes, low back pain (LBP), Osteoarthritis, Spinal stenosis.

### INTRODUCTION

Low Back Pain (LBP) is widely recognized as a major medical and social problem and represents a considerable burden to healthcare [1]. Pain is defined as "an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage [2]. Low Back Pain is the pain in the area between the 12th rib and gluteal folds with or without radiation to the lower extremities [3]. According to Van den Bosch *et al* [1], it has been a major cause of discomfort and disability, often the principal cause of activity restriction in many persons younger than 45 years of age. Again, as many as 25% adults experience low backache in a given year and up to 75% have experienced it at some time and contacted a General Practitioner. Research has shown that, Low Back Pain is neither a disease nor a diagnosis, but it is a symptom of an underlying pathology [4].

### LITERATURE REVIEW

All human spines degenerate with time and it becomes evident within the 3<sup>rd</sup> decade of life. In Ghana over 60% of the adult population complains of waist pains at one time or the other

[5]. The Norwegian Back Pain Network [3] has suggested that, 80% of the causes of LBP are from Non specific causes, 15% are from Nerve Root Affections and 5% are due to possible underlying pathologies. Osei [5] suggested that, the onset of changes occur earlier in males and affects the L3/L4, L4/L5 and L5/S1 intervertebral discs. Radiographic changes such as disc space narrowing and osteophytes are usually accompanied by these degenerative changes.

According to Van Tulder *et al* [6], risk factors for LBP include mechanical strain on the spine from heavy lifting, repetitive lifting, bending, twisting and vibration due to occupational activities. Also, static work postures, prolonged standing or walking, road traffic accidents and falls also show a link. Another study also showed that, people who do not exercise result in muscle inflexibility, which restricts the body's ability to move, rotate, bend and regularly face an increased risk for low back pain, especially during times when they embark on stressful activity like moving heavy items [7]. Athletes are prone to back injuries due to improper exercise instructions and inattention to mechanics which can be sources of sudden trouble and may increase the risk for degenerative disc disease [8].

Excessive strain or compression of the spine may cause disc herniation, in which the disc bulges or even ruptures. The bulging disc or its fragments may be displaced outward, putting pressure on nerve roots entering or exiting the spine, thereby causing pain and this pain may reduce the flexibility and the endurance of the lumbar spine during physical activities [9]. Most disc herniations occur in the lumbar or lower part of the spinal column, especially between the fourth and fifth lumbar vertebrae (L4 and L5, respectively) and between the fifth lumbar and first sacral vertebrae (L5 and S1, respectively) causing severe sciatica and nerve pain down the legs [9]. Plain radiography is recommended for initial evaluation of possible vertebral compression fracture in selected higher-risk patients, such as those with a history of osteoporosis or steroid use [10]. MRI or CT is recommended in patients who have severe or progressive neurologic deficits or are suspected of having a serious underlying condition (such as vertebral infection, the cauda equine syndrome, or cancer with impending spinal cord compression) because delayed diagnosis and treatment are associated with poorer outcomes [11, 12].

## METHODOLOGY

A quantitative and cross-sectional study design was used for the study. The study was carried out in one of the Radiology Departments in a Teaching Hospital in Ghana. The study covered all reported LBP (Lumbar) investigations within the department from procedures such as Computed Tomogram, Post-Myelogram Computed Tomography, Magnetic Resonance Imaging, and Conventional Radiography. The sample size was 600 reported Lumbar investigations at the radiology department involving patients who were at least age 18. Convenient sampling was used to select the radiological reports from the Radiology Records Department with the history of low back pain until the stipulated size was obtained.

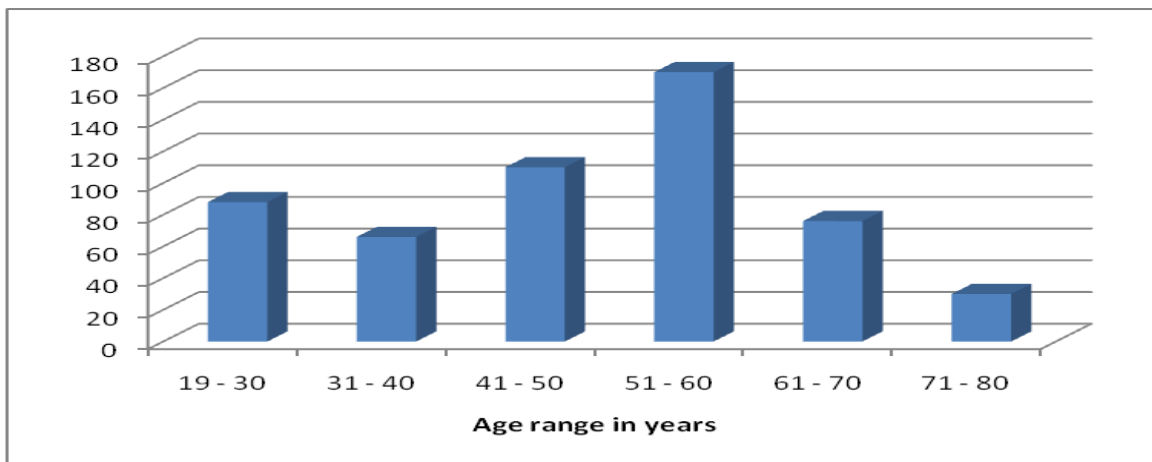
The data collected was analyzed with SPSS version 18.0. Descriptive statistics of frequency distributions, bar charts and percentages was used to present the data collected. Chi-square was also used to determine the association. A *p*-value of 0.05 was set and any *p*-value less than this was accepted and those greater were rejected.

Approval for the study was obtained from the research ethics committee of a higher education institution. The ethics approval was supported by written permission for the study to be

conducted at the study sites. The ethical standard of confidentiality was upheld. Permission was also sought and gained from the authorities at the selected hospital.

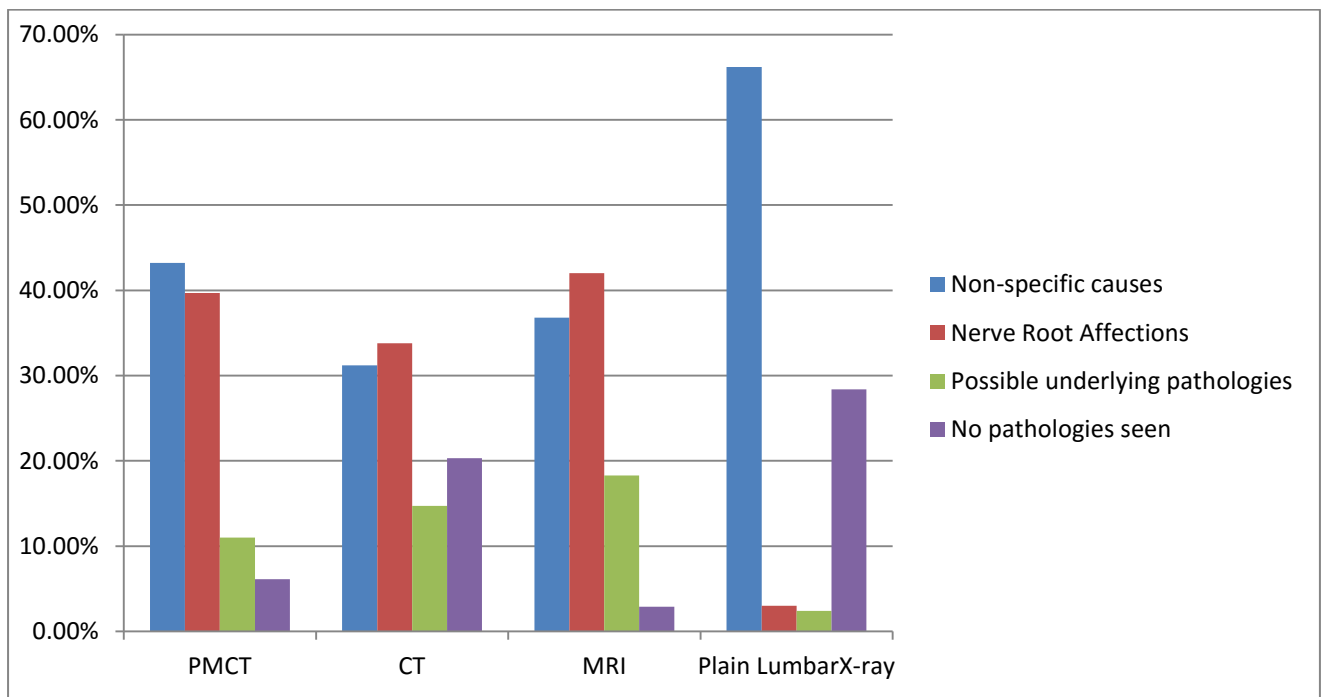
**RESULTS**

The study was conducted using reported LBP investigations namely; Plain Lumbar x-ray, Lumbar CT, PMCT and Lumbar MRI in the radiology department. A total of 540 reports were used instead of the estimated 600 reports representing 90% and were analyzed using SPSS version 18.0. The results are presented below in tables, charts and graphs. For the gender distribution among LBP patients, (N=540), there were 304 female patients representing 56% and 236 males representing 44%.



**Figure 1:** Age distribution among LBP patients (N=540)

The age range of 19-30 years had 88 patients representing 16.2%, 31-40 years had 66 patients representing 12.2%, 61-70 years had 76 patients representing 14.1% and 71-80 years had the lowest of 30 patients representing 5.6%.



**Figure 2:** the percentages of the categories of the causes LBP in their various examinations.

Non Specific cause recorded highest with 66.2% in plain lumbar x-ray report and least in CT with 31.2%. No pathologies were seen much (28.4%) in Plain lumbar x-ray and least (2.9%) in MRI.

**Table 1:** Categorization of causes among males with the percentages (n<sub>m</sub>=236)

<b>Male</b>			<b>Freq.</b>	<b>Percent</b>
Non-specific causes	Degenerative disease		40	17
	Spondylolisthesis		10	4.2
	Scoliosis		4	1.7
	Spondylosis		44	18.7
	Kyphosis		2	0.8
	Limbus vertebrae		4	1.7
	Musculoligamentus pain		2	0.8
	Myalgia		4	1.7
<b>Sub total</b>			<b>110</b>	<b>46.6%</b>
Nerve root affections	Bilateral foramina herniation		2	0.8
	Nerve root compression		18	7.6
	Canal stenosis		16	6.8
	Spinal stenosis		8	3.4
	Cord compression		2	0.8
	Disc dehydration		2	0.8
	Disc herniation		22	9.4
	Disc prolapsed		8	3.4
<b>Sub total</b>			<b>78</b>	<b>33%</b>
Possible underlying pathologies	Bone metastasis		2	0.8
	Brucellosis		2	0.8
	Fracture		6	2.6
	Haemangioma		6	2.6
	Osteomyelitis		2	0.8
	Osteoporosis		2	0.8
	Pott's disease		4	1.7
	<b>Sub total</b>			<b>24</b>
<b>No pathology seen</b>			<b>24</b>	<b>10.2%</b>
<b>Total</b>			<b>236</b>	<b>100%</b>

Out of the causes under Non Specific Cause, Spondylosis was the highest representing 18.4% (44/236). Nerve Root Affections, Nerve Root Compression was the highest representing 7.6% (18/236). Possible Underlying Pathologies, Haemangioma and Vertebra Fractures were the highest with 2.6% (6/236) each.

**Table 2:** Categorization of causes among females with the percentages, n<sub>f</sub>=304

Female		Freq.	Percent
Non-specific causes	Degenerative disease	32	10.5
	Spondylolisthesis	32	10.5
	Scoliosis	14	4.6
	Spondylosis	74	24.3
	Osteoarthritis	4	1.3
	Myalgia	4	1.3
<b>Sub total</b>		<b>160</b>	<b>52.6%</b>
Nerve root affections	Bilateral foramina herniation	2	0.7
	Nerve root compression	14	4.6
	Canal stenosis	26	8.6
	Cord compression	2	0.7
	Disc herniation	18	5.9
	Disc prolapsed	10	3.3
<b>Sub total</b>		<b>72</b>	<b>23.7%</b>
Possible underlying pathologies	Bone metastasis	4	1.3
	Extradural lesion	2	0.7
	Fracture	6	2
	Haemangioma	4	1.3
	Facet joint disease	4	1.3
	Tumour	2	0.7
	Pott's disease	6	2
	Chronic infection lesion	2	0.7
<b>Sub total</b>		<b>30</b>	<b>9.9%</b>
<b>No pathology seen</b>		<b>42</b>	<b>13.8%</b>
<b>Total</b>		<b>304</b>	<b>100%</b>

Non Specific Cause, Spondylosis was the highest representing 24.3% (74/304). Nerve Root Affections, Canal Stenosis was the highest representing 8.6% (26/304). Possible Underlying Pathologies, Pott's Diseases and Vertebra Fractures were the highest with 2.0% (6/304) each.

### TESTING HYPOTHESIS

**Table 3:** Testing for the hypothesis that there is no difference between the prevalence of LBP among females and males

Cause of pain	Male	Female	Total
Non-specific causes	110	160	270
Nerve root affections	78	72	150
Possible underlying pathologies	24	30	54
No pathology seen	24	42	66
<b>Total</b>	<b>236</b>	<b>304</b>	<b>540</b>

$$\chi^2 = 5.64$$

$$p\text{-value} = 0.13$$

## DISCUSSION

It was observed that, majority of the patients with LBP were women (56%) while the males had 44% of the total population. Some studies showed that women occupations usually involve heavy and repetitive lifting, twisting and bending [6] and they do not often exercise which results in muscle inflexibility putting them at a higher risk of LBP [7]. This probably might have been the cause of a higher prevalence in women. In contrast, Hoppenfeld [9], suggested that, the onset changes of LBP occur earlier in male but it does not oppose this work because the onset of LBP was not captured.

With the Age distribution of LBP from Figure 1, a normal distribution was noted from the age range of 31-40 years to 71-80 years peaking at age range of 51-60 years with 31.5% of the total population. The age range of 19-30 years was made up of more students and young adults who have just started working. Even though, this age group had a higher percentage of 16.2 than 31-40 years age group, no visible pathology was seen in most of their reports representing probably myalgia (muscle pain). However, a few of them presented with congenital or abnormal curvatures such as scoliosis and Kyphosis. So far, the prevalence of LBP increases with age as shown in the results. With increasing age, the fluid cushioning the intervertebral discs tends to dry up, making the vertebrae more brittle and less protective [1]. The results showed that, the prevalence of LBP increases with age up to the age range of 51-60years but reduce afterward. Age 40years to 59years are known to be the working age group and are more prone to LBP depending on the nature of their jobs and their lifestyle and it was also emphasized by Van den Bosch [1] that, LBP is a principal cause of activity restriction and work disabilities in many persons younger than 45years of age. Studies by Osei [6], attested to the fact that LBP is a normal finding associated with age in most cases. Above age 60, work stress decreases, lifestyle decreases and mortality increases probably accounting for the gradual decrease in their number.

## CAUSES AMONG GENDERS

The causes of LBP were categorized among the genders in Table 1 and 2. Table 1 indicated the categorization among the males where as that of Table 2 showed that of the females. Non-Specific Causes were noted to be prevalent among both males and females with 46.6% of the total male population and 52% of the total female population respectively. Within the Non-Specific Causes, Spondylosis was prevalent in both genders with 40% (44/110) in males and 46.2% (74/160) in females. It was followed by Degenerative diseases with 36.7% (40/110) males and Degenerative diseases and Spondylolisthesis in females both with 20% (32/160). Spondylosis and degenerative diseases are noted with increase in age because they gradually cause deterioration in the structure of the vertebra. However, a study by Ogwumike *et al*, [8], emphasized that improper exercise instructions and inattention to mechanics rather increases the risk of degenerative disc disease.

With nerve root affections, males had 33.1% (76/236) of the total male population and females had 23.7% (72/304) of the total female population. With the various causes under Nerve Root Affections, Canal Stenosis had the highest count of 36.1% (26/72) in females and Disc Herniation, highest in males with 28.2% (22/78). Bilateral foramina herniation had the lowest of 2.7% (2/72), in females but both bilateral foramina herniation and disc dehydration had the lowest of 2.5% (2/78) in the males.

Spondylosis was shown to be prevalent among all the age groups except for the age group 71-80 years where Degenerative diseases emerged prevalent. In the age group 19-30years, Spondylosis and Nerve Root Compression were prevalent with 11.3% (10/88) each. Spondylosis was prevalent with 21.2% (14/66) in the age group 31-40years and 21.8% (24/110) in the age group 41-50years. It was again prevalent in the age group 51-60years with 35.3% (60/170), and in age group 61-70years with 28.9% (22/76). Spondylosis is a normal finding associated with age in most cases with an increased risk of LBP and it also results in osteophytes formation, decreased disc height, a narrowed foramen and hypertrophied facet joints [3]. In testing for hypothesis in the prevalent cause of LBP among the age groups, a  $p$ -value  $< 0.001$  recorded was less than  $p$ -value of 0.05 (Table 3); hence the null hypothesis will be accepted that there is no difference in the prevalent cause of LBP among all the age groups. By objective assessment, it was noted that Non Specific Cause of LBP was prevalent among all the age groups as proved by the hypothesis.

The null hypothesis, which also states that, there is no difference between the prevalence of LBP among females and males, had a  $p$ -value 0.13 which was greater than 0.05, hence it was rejected.

## RADIOLOGICAL EXAMINATIONS

Figure 2 revealed that, no pathologies were seen in 28.4% of patients who had a radiologic report on plain lumbar x-ray reported that but in MRI, only 2.9% had such report. Studies by Thompson & Carr [7] have shown that, LBP is associated with problems from structures like ligaments, facet joint, vertebral periosteum, intervertebral disc, fascia and spinal nerve roots and it can also be as a result of fractures, muscle spasms, pressure on a weakened disc that may cause protrusion or herniation of the disc. Deyo & Weinstein, [13] also stated that, misalignment or deteriorated facets and spinal stenosis are conditions that stretch or pinch on the nerve roots causing severe pains in low back but Plain Lumbar x-ray demonstrate only problems associated with the bones with associated problems of muscles, ligaments, nerves, vertebra disc, and other soft tissues missed. In such patients, Plain Lumbar x-ray only increases radiation dose and hospital bills but not diagnostic enough. Lumbar CT also presented 20.3% of reports with no pathologies seen but PMCT presented a small number of 6.1%. According to Jarvik & Deyo[10], while CT scans provide superior bone detail for depicting spondylolysis, pseudoarthrosis, scoliosis and fractures they are not quite as useful in providing good view of changes in the soft tissue areas in the spinal canal including Herniated Discs and in Disc Protrusions. Lee *et al*, (1999) also stated that, CT alone gives a better resolution than plain x-ray but a combination of CT and Myelogram in PMCT gives a better diagnostic report but suffers the disadvantage of requiring lumbar puncture and contrast injection. For a better diagnosis of LBP, MRI and PMCT should be opted for but since it is highly expensive and has low availability, plain x-ray can be an alternative for those whose conditions are bony related.

## CONCLUSION

LBP is more prevalent in females than in males and it increases with age peaking at the age range of 51-60 years. Non Specific Cause is much prevalent, then followed by Nerve Root Affections and then the Red Flags. Non Specific Cause is most prevalent within all the age groups except in 71-80 years where Non Specific Cause and Nerve Root Affection were both prevalent. With Non Specific Cause, Spondylosis was the most prevalent in all most all the age groups followed by Degenerative diseases and then Spondylolisthesis. With the Nerve

Root Affections, Canal Stenosis was higher in males and Disc Herniation, higher in females. To analyse the diagnosis tool for LBP radiologically, MRI and PMCT and sometimes CT gives a clearer and a better diagnosis and should be more preferable compared to Plain X-rays. But since they are relatively very expensive and have low availability, Plain X-rays can be requested for cases relating to bony structures. Otherwise, patients will be irradiated just for an undiagnostic report.

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