



## Back Pain: A Jigsaw Puzzle

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### Abstract

Back pain is so common and can be traced back to the recorded history of the mankind but still a jigsaw puzzle for the doctors. No medical problem of the human body matches in mysteriousness of the Back pain, leading to so many fears, fallacies, folk stories, and mysterious remedies making it enigma for medical community. It looks so strange that it is so common as 4 out of 5 of us experience it in our lifetime but at the same time the least understood phenomenon it is. Hundreds of etiological factors were suspected in the history including even the Devil's involvement, similar numbers of remedies were advised and practiced ranging from simple assurance to heroic and novel surgery, that suggests neither we know the exact cause nor its treatment.

The modern diagnostic modalities have made the situation even more confusing, making the physicians to depend more on the modern technology of imaging and less of clinical capability. A brief overview of early theories and modes of managements are discussed bringing up to the present thoughts and management. The future of its management is left open for the audience to think and explore the definite management instead of treating back pain myopically and suspecting disc and degeneration as main culprit and treating it with undue surgery. Biological management of back pain and sciatica is in experimental stages and should also be explored instead of relying on it blindly as we are practicing surgery as the best option at present.

**Keywords:** Puzzle; Back pain; Pathophysiology

### Introduction

Back pain is an epidemic faced by medical community since the recorded history in human species and surprisingly at the same time despite of all the progress and development in the medical sciences still the least understood phenomenon in medical field with certainty, though there are "hundred and one" causes, theories, remedies claiming good results but no agreement among the on standard. This ignorance demands more vigorous research to find out the exact pathophysiological process and its standard remedy. At present we have only two visual causes of back pain, Disc and Degeneration apart from infection, trauma and congenital deformity so hammering it with "discectomy" and "spinal fixation", which is like "if you have hammer (surgery) in a hand, anything looks nail (disc and degeneration)". If this philosophy cannot be opposed definitely it need exploring the outcome comparing with conserva-

tive or least invasive procedures. Unfortunately "discectomy" has become "bread and butter" of some surgeons for the back pain and sciatica that could have been treated with conservative or least invasive procedures reducing the patient morbidity. Such practice should be discouraged through public health awareness in the areas where patient blindly trust the physicians. The historic review of the back pain is added as it goes back to the recorded history of mankind, which shows how demanding this phenomenon is to be explored with present advancement in the medical sciences.

### Back pain presentations

Back pain can present in one or combination of the following

1. Simple Back Pain or Lumbago.
2. Nerve Root Pain or Sciatica.
3. Serious Spinal Pathology (infection or disease).
4. Spinal Emergency (Cauda Equina Syndrome).

### Pathophysiology of back pain

The pathophysiology of the back pain can easily be understood by following diagram from the paper by Kirkaldy-Willis, *et al* [17] which demonstrate the disc derangement with nuclear absorption, annular tear, herniation of fragment and progressive changes in joints and discs entrapping the nerves and stenosis. This paper dominated for three decades. It conceptually divides disc degeneration in stages of dysfunction, instability, and stabilization.

This paper had some limitation, as it does not give time frame of these changes and pathophysiology of pain generation.

The pathogenesis of the pain generation involves chemical mediators prostaglandins, leucotrienes, interleukin1 beta, and tissue necrosis factor. Targeting only prostaglandins gives limited relief.

### Historic review

Very quick and brief historic review is here keeping the limitation of space provided. History of back pain goes back to at least the Bronze Age (2000 BCE - 500 BCE). The Edwin Smith Papyrus (1500 BCE) described it "vertebral sprain" whereas the Hippocrates used the term sciatic pain and LBP (460 BCE - 370 BCE).

Hippocrates related it with even weather changes, more frequent in summer and autumn [5] and upper social class [6]. He also stressed on relationship of sciatica, antalgic gait, and claudication in a patient suffering from back ache. He was the first one who stressed to know the anatomy first for the understanding of any disease [8]. It was also suspected that hip joint disease is the cause of sciatica and back pain [5]. Greek and Romans have firm belief in such pathology. Romans also related it with gout, poliomyelitis, tuberculosis, and hip dislocation.

Galen described the back pain in depth in late second century CE. Watchful waiting was the treatment till the end of first Millennium. He observed abnormal spinal postures, lordosis and kyphosis, attempted to correct them. He used bloodletting to treat sciatica to remove the noxious humours as he was suspecting it cause of the disease.

Roman physician, Caelius Aurelianus in 5<sup>th</sup> century AD, introduced exercises and spinal traction to treat back pain and sciatica. He considered the most eminent Greco-Roman physician after Galen treating back pain though he was not very clear rather confused about the pathology suspecting humour as cause of back pain and sciatica.

Paulus Aegineta, Alexandrian physician (ca 625 - 690) wrote medical book (*Epitomae medical libri septem*) in seven volumes covering all the medical knowledge of that time, described sciatica in detail but continuing the theory of humour causing this condition. Medieval period (5<sup>th</sup> to 15<sup>th</sup> century), Spirits were suspected and treatment was based on such beliefs [1].

In 16<sup>th</sup> and 17<sup>th</sup> century (Dark ages), the veins of the lower limbs were suspected as culprit and bloodletting and cautery got popular treatment of sciatica, which is still practiced in some parts of the world. The care was shifted in to the hands of church so the medical insight was stopped but folk medicine did persist.

It took many centuries to disregard the Galen's concept of humour as cause of sciatica as well as involvement of hip pathology and start thinking on scientific bases. In 1764 it was breakthrough when hip pain and sciatica were described separately [12,13].

In 19<sup>th</sup> century, lumbar Disc pathology and vertebral column took pivotal role in the etiology of back pain and sciatica. It worked as foundation for modern way of approaching the back pain and sciatica. They observed lumbar disc herniation during autopsies. Disc protrusion, cord compression, straight leg raise as stretch test, sciatic scoliosis, spinal nerve irritation, degeneration, trauma, and laminectomy were described. The names for this work involved were Kocher, Lasague, Laza Lazarevic, AG Smith, JJ Forst, Brown, Virchow, Fedor Krause, Herman Oppenheim, Postacchoni, Davide Giordano, Von

Luschka, Parrish, Olliver, Stilling, and Sir Victor Horsley.

In 1900, Davide Giordano performed laminectomy and sectioned the nerve roots [11,14]. Schmorl in 1925 described the pathology of prolapse and degeneration of nucleus pulposus. Vittorio Putti in 1927 described degenerative changes in the intervertebral foramen causing nerve root compression.

New theories emerged during 1920s and 30s, nerve weakness, psychological disorders, injury, rheumatism, fibromyalgia were suspected as culprits of LBA [2,3]. "Rupture of intervertebral disc with involvement of spinal canal" by Mixter and Barr was presented in 1933 in New England Surgical Society and was published in 1934, which was the start of new era for surgical option of intervertebral disc pathology that is prevailing till today. He was credited for describing the relationship between disc and sciatica [15].

It was thought that the LBP was due to inflammation or damage to the nerves and terms "Neuralgia and Neuritis" were used in the early 20<sup>th</sup> century [2]. Harvey Williams Cushing, an American neurosurgeon promoted surgical treatment for the low back pain [3]. The use of X Rays as diagnostic tool intervertebral disc was blamed for the back pain and got more strengthened with arrival of CT and MR imaging resulting in surgical treatment over for nearly half the century and still in practice but research did not prove the disc as sole cause of back pain neither the surgical treatment as sole remedy for back pain and sciatica. With the advancement, micro discectomy and endoscopic discectomy are now widely in practice to address the intervertebral pathology [16]. Biological treatment is emerging as new option but it has to be proven.

### Suspected or proposed ethology

Innumerable causes are suspected whereas doctors rarely are able to make diagnosis. Mostly labelled as "Non Specific LBP". Most of the causes need patient's attention and rarely needs doctor's help. Hundreds of etiological factors were suspected in the history including even Devil's involvement. Here is endless list of causes Lack of exercise, Obesity and overweight, Footwear, Furniture, Improper way of lifting, Smoking, Pregnancy, School bags/backpacks, Depression, Anxiety, Joblessness, Sedentary life style, Poor posture, Stress/tension at workplace, Prolonged sitting/standing, Prolonged driving, Improper sleeping posture, Improper carrying, Pronged use of computer, Activities resulting in stress on spine, sleeping disorders, Injury (Nerve, Disc, vertebra, ligaments, joints), Diseases (Urological, Gynecological, Hematological, Rheumatologic, Metabolic, HIV, Cancer, TB), arthritis, infection, osteoporosis, Deformity (congenital or post trauma), Degeneration (Spondylosis), prolonged use of steroids, Spinal stenosis, Shingles, unaccustomed exercise or physical work, lying on ground, and immoderate sexual acts.

In the beginning of the last century, many heterogeneous etiologies coexisted whereas in the second half of the century, disc degeneration and injury took over almost entire literature about low back pain. A tendency to prefer organic, visible abnormalities to diagnose the pathology took over the clinical judgment though there is very high rate of false positive MRI results in patients with back pain and sciatica leading to undue surgery.

### Remedies of back pain

As there is endless list of causes of back pain, similarly, numbers of remedies were advised and practiced including passing through

the narrow hole and walking on the back of strained patient. Here is a list of few Acupuncture in stone age, Inversion therapy in 400 BC, Blood letting, Chiropractic treatment since 19<sup>th</sup> century, Osteopathy since 1892, Traditional and Spiritual remedies, Spinal manipulation, Spa, Application of soothing or counter irritants, Folk medicine, Bed rest, Massage, Heat and cold packs, Exercises, Leeches, cupping, skin hooks, burning the leg with hot iron, physiotherapy, injections, Psychological counseling, Massage, heat, dietary alterations, music "to pipe away pain", in ancient times, treating sciatica with a mixture of "rosemary leaf, wine and olive oil;" this concoction was combined with wax and stored in an earthen jar for future use as a plaster [9], application of honey on the back, Avicenna recommended less physically aggressive picrotoxin for the treatment of sciatica [10]. Warm water applied to the painful area, fumigations, fasting, and subsequently laxatives and ingestion of boiled milk of the female ass [11], affected legs were smoked in fire of ferns, it was believed that mother or child of breech birth have special power to treat back pain, going to shrines for pray to cure, presently some of the treatments described above are still in practice. But the most common treatment is still the surgery, which need to be reviewed critically comparing the results with nonsurgical remedies. Biological treatment is emerging modality but have to prove its effectiveness against surgical option.

### Conclusion

Keeping the above etiologist and remedies, it is clear that despite of huge advancement we still do not know the exact cause of back pain with certainty. There are number of treatments in practice but none of these can claim the only or standard treatment to address the back pain. Relying on modern imaging modalities is taking us further away from clinical judgment as sciatica can be managed by medication and non-surgically in majority of the cases whereas MRI findings pushes for surgery. Days are ahead when surgery will only be indicated in cauda equina lesion and rest of the cases will be dealt non-surgically. Selection of cases is important to avoid adverse events if going for surgical. Even regarding biological treatment one should not rely blindly as relying on imaging findings to avoid bad results. The field is open for us to explore.

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