



CHRONIC NONSPECIFIC LOW BACK PAIN: APPROACH TO CLINICAL DIAGNOSIS.

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Abstract:

Introduction: Globally low back pain is a major public health issue affecting all age group. A brutal majority of all cases (80% to 90%) are nonspecific in nature without any recognisable aetiology. Hence delayed diagnosis and inadequate treatment leads to chronic low back pain in many cases affecting productivity and consequent loss of man-hours amongst a sizeable working population.

Materials and Methods: 523 cases with low back pain of more than 3 months duration with no specific clinically identifiable cause for back pain were evaluated from August 2019 to July 2021. A detailed history followed by a thorough clinical examination was done for all patients. The clinical criteria for establishing the sub types of chronic non specific low back pain were the predominating symptom and presenting sign. The data were analysed using Microsoft Excel Software.

Results: There were 289 males and 234 females with average age being 43.64 years. Discogenic chronic low back pain (CLBP) was the commonest (48.75%) type, and least being sacroiliitis (1.72%). Facetogenic type was seen in older age (57.3 years) group, as against younger age (29.6 years) in postural chronic low back pain.

Conclusion: Detail history and meticulous clinical examination is the key to diagnose and differentiate various sub types of nonspecific CLBP. Radiological evaluation, diagnostic blocks and provocative tests may enhance the accuracy in diagnosis.

Key words: Discogenic, Mechanical, Postural, Instability.

Introduction:

Low back pain is a major public health concern and socioeconomic burden, all over the world affecting individuals of all age groups¹. In about 80% to 90% of LBP cases, there is no specific

identifiable cause, therefore, termed as non-specific LBP, and the remaining 10% to 20% cases definite aetio-pathology may be identified, hence termed as specific LBP^{2,3}. The majority of acute low back pain cases resolve in two to six weeks. However, delayed diagnosis and inadequate treatment leads to recurrent, episodic LBP (sub acute LBP), a small percentage of which eventually progresses to chronic LBP^{4,5}.

Based on the duration of symptoms, LBP can be classified into acute when it lasts for 6 weeks, sub acute when it lasts for 6 weeks to 12 weeks and chronic when it extends beyond 12 weeks⁶. The prevalence of low back pain (LBP) and chronic low back pain (CLBP) varies across nations and among different age, sex and population groups. Systematic literature review by Walker et al⁷ reported, the point prevalence ranged from 12% to 33%, one year prevalence ranged from 22% to 65%, and lifetime prevalence ranged from 7% to 85%^{5,8,9}. The prevalence of recurrent back pain in a year is 24% - 80%^{5,10}, and the disability is 11%-12%⁵. The life time prevalence rate increases steadily with age and approximate to adult level by around 18 years of age⁹. There is no significant difference of prevalence of low back pain between teenager and adults¹¹.

Chronic nonspecific low back pain(CNSLBP) is generally diagnosed when the specific pathology related to spine or nerve root(s) are ruled out by red flags, X rays MRI scan⁶. CNSLBP is the second leading cause of physician's visit, second leading cause of disability¹² leading cause of lost time at work, and most common factor responsible for limitations of physical activity in persons less than 45 years of age¹²

According to European guidelines for the management of CNSLBP, nonspecific low back pain is defined as low back pain that is not ascribable to a recognizable, specific pathology (e.g., structural deformity, tumour, infection, osteoporosis, fracture, and inflammatory diseases, such as ankylosing spondylitis, radicular syndrome, and cauda equina syndrome^{13,14}.

The prevalence of CLBP is 23%^{3,5}. Study by I Yochi et al¹⁵ revealed the prevalence of CLBP in middle aged and in elderly Japanese population is 15.4% and 24.8% respectively. It is also seen that the prevalence of CLBP is directly proportional to the increasing age of the patient¹⁵. Cross sectional population based studies and cohort studies by Meucci *et al*¹⁶ revealed the prevalence of CLBP among adults is 4.2% among individuals aged between 24 and 39 years and 19.6% among the adults aged between 20 and 59 years. The literature review suggests, prevalence of CLBP on rise over years, i.e. 3.9% in 1992 to 10.2% in 2006¹⁷.

CNSLBP is closely associated with recurrence, lost work time, decreased health related quality of life, decreased physical fitness¹⁸, strength, function and decreased physical activity^{19,20}.

It has been proven by Patrick N *et al*⁸, Bogduk *et al*²¹, Kuslich *et al*²², that innervated anatomical structures such as fascia, muscles, disc, ligaments and bone have the potential to generate and transmit pain in lower back. Hence it is logical to conclude that, pathology arising from these anatomical structures is the cause and source of back pain.

Various predisposing and contributing factors for CNSLBP are high BMI²³, smoking²⁴, sleep disorders²⁵, genetic predisposition⁵, and pre-existing psychological disorders^{26,27} and advanced age¹⁶.

Diagnosing non specific LBP has been very challenging for physicians all over the world. History and meticulous clinical examination have been the main corner stone. Diagnostic tools such as flexion and extension standing roentgenogram, Magnetic Resonance Imaging (MRI), Computed Tomography (CT), Provocative Discography, and serodiagnosis (hCRP), have solved the diagnostic dilemma to a great extent. However, there is inappropriate correlation of clinical diagnosis with radiological investigations^{28; 29}. Never the less, in various rural set up in developing countries, the facility of higher imaging techniques like CT scan, MRI scan are unavailable. Hence a meticulous clinical examination preceded by a detailed history taking remains the cornerstone in coming to a clinical diagnosis.

Various clinical classifications CLBP have been in force since decades^{30,31}. Fairbank J *et al*³¹ postulated that the classifications should be both descriptive in nature with prognostic importance and should help a physician on executing different modalities of treatment. McKenzie³⁰ observed three

well defined clinical types of CLBP i.e. derangement syndrome, dysfunction syndrome, and posture syndrome, but with moderate evidence of effectiveness in pain reduction and functional improvement^{32, 33}.

It has been seen that detailed history and stringent physical examination remain the main clinical diagnostic guidelines⁵, and it helps in avoiding unnecessary investigations and surgeries^{5, 34}. According to the American College of Radiology (ACR) Appropriateness³⁵ criteria for low back pain, radiological investigations should be reserved for patients with failed conservative treatment of more than 6 weeks or patients with red flags^{36,37}. It has also been proved that, clinical evidence of radiculopathy is not an indication for early radiological investigation as it may be associated with unnecessary surgeries with poor outcome. Therefore in simple CLBP cases, symptomatic relief and specific targeted therapy has been advocated after completing thorough clinical evaluation⁴. In developing countries, many people from weaker sections present late to the physician and cannot afford to undergo multiple diagnostic and provocative tests to ascertain the type of nonspecific pain. The primary aim and objective of this study are to formulate a clinical approach to diagnosis in the OPD itself, to find out the types of chronic non specific low back pain in our clinical practice without any diagnostic aid.

Materials and Methods:

This is a prospective but non randomised study conducted in Kalinga Institute of Medical Sciences (KIMS), Bhubaneswar, Odisha. 1640 out patients were examined from August 2019 to July 2021. 523 patients were considered for study. The inclusion criteria were, patients aged between 20 years to 60 years, with back pain for a minimum 3 months or more. The exclusion criteria were patients aged less than 20 years and more than 60 years, previous spinal disorders, spinal surgeries, concomitant cervical spine disorders, vertebral fracture/tumour, hip disorders, pregnant women, and patients with inflammatory bowel diseases, inflammatory arthritis, such as rheumatoid arthritis and ankylosing spondylitis. Patients with suspected sacroiliitis associated with any medical diseases, patients with leg pain, sciatica, neuropathic pain (prolapsed intervertebral disc, lumbar canal stenosis) were excluded. Patients not willing to participate were also excluded from the study. Coccydynia cases were not considered for this study as the diagnosis and pathology were evident. Informed consents were taken from all patients in the study group.

All the participants were examined clinically in detail after a thorough history. History included anatomical location of pain, duration, and radiation of pain, aggravating & relieving factors, leg(s) pain, paresthesia, neurogenic claudication, associated bladder or bowel symptoms. Red flags for infection (fever, loss of appetite and weight, personal and family history of tuberculosis), Red flags for malignancy (continuous back pain, severe back pain, pain at rest, night pain), red flags for trauma (older age, trivial trauma and fracture, immunosuppressive drugs i.e. corticosteroid use) were noted and excluded from the sample population. Local Clinical examination such as, gait, local skin inflammation, swelling, spinal deformity, spinal range of motion (ROM) were noted. De Palma *et al*³⁸ method was used for all patients to localise the anatomic site of pain. In this method the patients were asked to localise the site of pain by one finger i.e. mid line of the spine, para spinal or over SI joint. Detailed sensory and motor examination including per rectal examination was done as and when necessary to exclude neuropathic CLBP. Three clinical tests were used as advocated by Gleb Slobodin *et al*³⁹ to diagnose sacroiliitis. One of the three test was FABER test in which, the hip is flexed abducted with knee in flexion and the contralateral iliac crest, and the knee is pressed down, inducing pain in ipsilateral SI Joint, The second test was pelvic rock test, in which the pelvis is compressed towards midline by placing hands over the iliac crest inducing pain in SI joint. The third test being Gaenslen manoeuvres in which, the leg is dropped on the side of the bed inducing hip into hyperextension and stressing the SI joint. One positive test out of three is considered to be sacroiliitis. However, all three tests have low sensitivity and specificity.

The predominant symptom as told by the patient and confirmed by the clinical examination was considered to be clinical diagnostic criteria of that particular type of CNSLBP. Detailed history and meticulous clinical examination was done for each patient to differentiate one type of CLBP from the other type of CLBP as there could be overlap of symptoms and signs. More careful and repeated examination was conducted for patients suspected to have instability CLBP as classical symptoms and signs are not always present in all cases. The authors categorised the CNSLBP into discogenic, mechanical, postural, instability, facetogenic, and sacroiliitis. Microsoft Excel software was used to analyse the data.

Criteria for Clinical Diagnosis

Discogenic Pain: Low back pain, centralisation symptoms, increases on bending forward, standing, coughing and sneezing. It is relieved on rest. Physical examination reveals mid axial spinus process tenderness, decreased or normal spinal range of motion (ROM) and negative straight leg raise (SLR).

Mechanical LBP: Pain localised to paraspinal area. Back pain is worse in morning and gradually improves as the day progresses and on physical activity such as walking. Most often, there is paraspinal muscle spasm, tenderness over facets and lamina with/without decreased spinal ROM and negative SLR.

Postural CLBP: Low back pain, localised to mid axial spine. It occurs on prolonged sitting or standing and decreases on rest. There may not be any positive findings. The spinal ROM is normal and negative SLR.

Facetogenic Pain: Pain localised to facet joint(s). The pain increases on extending spine and on spinal rotation. The pain decreases on forward spinal flexion. Spinal ROM (extension, rotation and lateral flexion) may be restricted. Often there is paraspinal spasm either on one side or both sides. The SLR remains negative.

Instability pain: Back pain localised to mid axial and or paraspinal area worsens on turning on bed, and activity. Palpable increased interspinous gap/widening on forward flexion of spine. There may or may not be Sill sign⁴⁰ or palpable step.

Sacroiliitis: Back pain localised to sacroiliac joint. Local tenderness, positive provocative tests such as, FABER test, Pelvic Rock test, and Gaenslen manoeuvre.

Results: A Total of 523 patients were analysed in this study. There were 289 males and 234 females with M: F ratio being 1.23:1. The average age of the study population was 43.64 years (20 years to 60 years). The average age of males was 43.55 years and 43.95 years for females (Table no 1).

There were 255 cases with discogenic CLBP (144 M & 111 F) (Table 1, Figure 1), which is the most common type (48.75%) of entire CLBP. Average age of the patients was found to be 36.2 years (Males 36.5 years & Females 35.9 years). 114 cases (70 Males, 44 Females) of mechanical CLBP were seen as second common type (21.79%). The average age of the patients was 42.3 years (Males 40.8 years & Females 44.8 years), (table 1). Furthermore, 59 cases of facetogenic CLBP (11.28%), 56 cases of postural CLBP (10.70%), 30 cases of instability CLBP (5.73%), 9 cases of sacroiliitis (1.72%). However, the average age of presentation was highest in (57.3 years) in facetogenic type of CLBP and the lowest being 29.6 years as seen in postural CLBP. Out of 523 patients, 517 patients (98.86%) presented LBP as their first symptom, 6 patients (1.14%), presented leg pain as first symptom and, 83 (15.86%) patients had additional leg pain as second symptom. But the predominant symptom for entire population and for each CLBP type was LBP (Table 2).

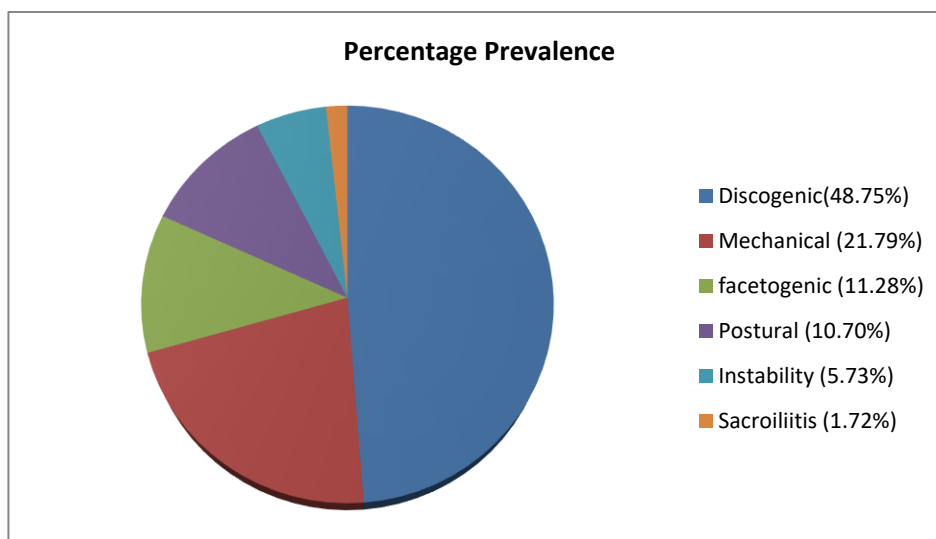


Figure-1, percentage Prevalence of CNSLBP

Table 1 Chronic Non Specific CLBP (Types, Population, Sex and Age distribution)

CLBP Type	n	%	M	F	Av. age	Av.age Male	Av.age female
Discogenic	255	48.75	144	111	36.2	36.5	35.9
			56.47	43.53			
Mechanical	114	21.79	70	44	42.3	40.8	44.8
			61.40	38.60			
Facetogenic	59	11.28	30	29	57.3	57.2	57.4
			50.84	49.16			
Postural	56	10.70	39	17	29.6	30	28.6
			69.64	30.36			
Instability	30	5.73	3	27	50.8	54	50.4
			10	90			
Sacroiliitis	9	1.72	3	6	44.2	39.7	44.2
			33.33	66.67			
	523	100	289	234	43.64	43.55	43.95

Table No 2 Chronic Nonspecific CLBP (Types, 1st, 2nd and Predominant Symptoms)

Types	n	1 st symptom%, Duration (months)		2 nd symptom% Duration(months)		Predominant symptom
Discogenic	255	LBP (98%)	Leg Pain (2%)	LBP (2%)	Leg pain (15%)	LBP (100%)
		28.12	7.6	16.25	12.51	
Mechanical	114	LBP 100%	Leg pain (0%)	LBP (0%)	Leg pain (17%)	LBP (100%)
		28.82	Nil	Nil	10.66	
Facetogenic	59	LBP (100%)	Leg Pain (0%)	LBP (0%)	Leg Pain (13.6%)	LBP (100%)
		42.70	NIL	NIL	4.85	
Postural	56	LBP (100%)	Leg Pain (0%)	Nil	Leg Pain (9%)	LBP (100%)
		20.42	Nil	Nil	12	
Instability	30	LBP (97%)	Leg pain (3%)	LBP (3%)	Leg Pain (43%)	LBP (100%)
		38.62	5	3	14	
Sacroiliitis	9	LBP 100%	Leg pain (0%)	Nil	Nil	LBP (100%)
		23.88	Nil	Nil	Nil	

Discussion:

Discogenic CLBP

This is characterized by back pain CLBP with or without radicular leg pain in presence of radiologically confirmed degenerative disk disease (DDD). Minimal disc degeneration may or may not cause back pain, however advance disc degeneration before the age of 60 years definitely causes back pain. Factors associated with accelerated disc degeneration are heredity⁵, high BMI, smoking⁵.

^{8, 10}. According to Kalichman et al^{41, 42} and Battie *et al*⁴³ disc degeneration has genetic background and 30%-46% of back pain is hereditary. A vibration from transportation and excessive axial loads as a cause is controversial.

Hyper sensitisation of nociceptors around annulus fibrosus is perceived as LBP, is chemically mediated by degenerated disc material containing proteoglycan and IL6². Hence it is believed that disc degeneration is one of the main reasons for CLBP. The discogenic pain is directly proportionate to the activity of disc degeneration but beyond 60 years of age, the back pain is rare as disc is fully degenerated. Studies by Yin-gang Zhang *et al*² suggested discogenic cause (39%) as the commonest type of CLBP. In our study, 48.75% (n=255, M-144, F-111), of cases had discogenic cause. The male female ratio was 1.29: 1. The average age of presentation is 36.2 years with no difference between males and females. 98% of patients presented with low back pain as their first symptom, whereas 2% presented leg pain as the first symptom. The average duration of LBP was 28.12 months and 7.6 months for leg pain.

Mechanical CLBP

In mechanical CLBP any anatomical structure or its alteration can be a source of pain^{8, 22}. The diagnosis is mostly based on history and clinical examination as the radiological investigations often remain inconclusive. It is a diagnosis of exclusion by radiological investigation or diagnostic blocks. In this study 21.79% (n=114, M-70, F-44), fell into mechanical CLBP, with male more than females. (M: F:: 1.59:1). The average age at presentation is 42.3 years. All of the patients presented with LBP as the first symptom have an average duration of 28.82 months.

Postural CLBP:

Multifidus muscle and Transverse Abdominis muscle work in tandem to maintain core stability of lumbosacral spine. Postural control of body is closely related to core stability⁴⁴. Alteration of core stability by poor stabilising muscles leads to postural low back pain. Clinical examination does not reveal any positive findings, and the diagnosis of postural CLBP is entirely based on history. It is seen in relatively active and younger age group. In our study 10.70% (n=56, M-39, F-17) patients presented with postural CLBP, with average age being 29.6 years. There was no significant difference of age between genders (M-30y vs. F-28.6y). The average duration of presentation was 25.82 months and LBP was the predominant presenting symptom in all cases. There has been no study on postural CLBP based on clinical examination alone.

Instability CLBP

Various conditions such as disc degeneration, post laminectomy and spondylolisthesis can predispose to instability. Clinical diagnosis of instability pain is often difficult, but it can be suspected on presence of Sill sign⁴⁰ or when there is a palpable or visible step with a demonstrable increase in inter spinal distance⁴⁰ on forward flexion of spine. Instability pain is a radiological diagnosis and most often it is associated with lumbosacral radiculopathy. In our series 5.73% (n=30) cases were instability CLBP. None of the patients exhibited Sill sign and inter-spinal widening could not be appreciated in any patient in this study population. It was more common in females as compared to males (27 vs 3). The average age at presentation was 50.8 years and 97% patients came with LBP as their first symptom, with mean duration of this being 38.62 months.

Facetogenic CLBP

The back pain is secondary to advanced degeneration of facet joints. It is believed that, the pathomechanics of facet degeneration is cartilage degeneration, focal and diffuse erosions with decreased facet joint space and sclerosis of subchondral bone. The risk factors of facet joint degeneration are older age, relatively more sagittal orientation of the facet joints, and degeneration of the intervertebral disc⁴⁵. Though more than one half of adults younger than 30 years exhibit facet degeneration, clinical manifestation of facet joints arthritis do not appear in all cases. However with further facet joint degeneration as seen in older patients, the symptoms become more apparent.

Literature review estimates the prevalence of facetogenic pain on diagnostic block in symptomatic patients to be 7.7% to 75%⁴⁶. SPECT/CT, MRI and diagnostic blocks definitely enhance and the accuracy of facet pathology but with poor correlation⁴⁷. Study based on CT scan in community patients by L Kalichman et al⁴⁸ revealed higher prevalence (66.7%) of facet joint degeneration in females than males (59.6%) and further increase in prevalence in both sexes with increasing age. P Suri et al⁴⁹ in their study based on CT scan on elderly population (Ave. age 67 years) concluded that facetogenic pain is seen more commonly in older age patients than adults and more common in females than males.

In our study there were 59 cases (11.28%) of facetogenic CLBP with equal number of males to females (M 30 Vs F 29) with average age being 57.3 years (max age 60 years). This is the third commonest type of CNSLBP in number same as seen in the study by Yin-gang Zhang et al². All the patients presented with LBP as their first presenting symptom with an average duration of 42.7 months (Table 2).

Sacroiliitis CLBP

Sacroiliitis often presents as a symptomatic entity or as an asymptomatic one seen on routine screening on X rays/MRI or CT scans. It is seen as an isolated disease or associated with various medical diseases such as, ankylosing spondylitis or Inflammatory Bowel Disease (IBD). In our series we have excluded cases of sacroiliitis associated with any known specific disease. Diagnosing sacroiliitis may often be challenging as SI joint is closer to other pain generators such as L5S1 disc, L5S1 facets and transverse processes. Most clinicians accept Laslett rule⁵⁰, i.e. minimum three out of five physical findings such as pain in SI joint after distraction, compression, thigh thrust, Gaenslen test or sacral thrust. However, all these tests have variable sensitivity and specificity. In our series, there were 9(1.72%) cases of sacroiliitis, as the study is based on history and clinical findings alone (Table 1, Figure 1)

CNSLBP Sub types Vs presenting symptoms

The duration of the first presenting symptom as LBP is highest i.e. 42.70 months in facetogenic CLBP, followed by 38.62 months in instability CLBP. It is understandable as both the types of CLBP is seen in older age group and degenerative process remains as the key pathology. The least duration of CLBP was 20.42 months which was seen in Postural CLBP. However in other types of CLBP the duration of LBP was still high within 23 months to 29 months. (Table 2)

The clinical categorisation of CNSLBP in this study was based on predominant presenting symptom only. All clinical subtypes had LBP (100%) as the predominant symptom (Table 2). However, a significant number of patients presented leg pain as the second presenting symptom. In instability CLBP 43%, in mechanical CLBP 17%, in discogenic CLBP 15%, in facetogenic CLBP 13.6%, and in postural CLBP 9% patients presented leg pain as second presenting symptom. This data gives us the following information.

- Any patient may have more than one presenting symptom out of which one is dominant. Patient may present LBP or leg pain as first presenting symptom and most often patients may not tell about the second presenting symptom.
- The significant percentage of patients had additional leg pain as second presenting symptom suggesting neuropathic component, hence may fall into mixed CNSLBP.
- This may serve as a guideline to evaluate and treat the patients as a whole rather than treating LBP or leg pain or predominant symptom alone.

CNSLBP Sub types Vs Population, Age and Sex

Out of 523 patients 48.75% (n=255) were Discogenic, 21.79% (n=114) mechanical, 11.28% (n=59) facetogenic, 10.70% (n=56) postural, 5.7% (n=30) instability, and the least 1.72% (n=9) as Sacroiliitis (Table 1).

The average age of study population (43.64 years) and average age of males (43.55 years) and females (43.95 years) were comparable (Table 1). However postural CLBP is seen at a lower average age (30 years) and facetogenic and instability CLBP is seen in much older group (average age 57.2 Vs 54 years respectively). The average age of males and females in each sub types of CLBP were comparable with each other.

It is understandable that the intervertebral disc gets completely degenerated by 60 years of age; hence discogenic pain is rare after the age of 60 years. The percent prevalence of discogenic pain in our study was 48.75%, which is comparable to studies done by Long et al⁵¹, Donelson et al⁵², but higher than Yin-gang Zhang et al². The average age of presentation in this study was 36.2 years (Table 1), which is comparable to the studies by Long et al⁵¹ (39 years) and Donelson et al⁵² (37 years).

The limitations of this study were lesser sample size, single author study, non blinded, and mixed type of CLBP was not taken into account.

Conclusion:

A detailed history and stringent clinical examinations remain key for diagnosing various types of chronic non specific low back pain. A sound knowledge of the anatomy of lumbosacral spine, study on kinesology and clinical experience is necessary to properly ascertain specific and non specific CLBP. However in cases where we have difficulties in ascertaining the exact cause we can utilise the additional diagnostic tools, diagnostic blocks and provocative tests to enhance the accuracy on diagnosing various clinical types of CLBP.

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