

MANAGEMENT PATTERN OF LOW BACK PAIN AT THE SPINE UNIT OF PHYSIOTHERAPY DEPARTMENT, UNIVERSITY OF PORT HARCOURT TEACHING HOSPITAL, NIGERIA

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Abstract

Background of the study: Low back pain (LBP) has been described as the single most significant contributor to musculoskeletal disability worldwide, and a major cause of decreased efficiency and well-being in the working populace. It is a common complaint in general outpatients and orthopaedic clinics. To mitigate attendant problems while aiding recovery, the Treatment-Based Classification system has been identified as an efficient and effective method of management.

Aim of the study: This study was aimed at analyzing the pattern of occurrence of low back pain and the nature of the Treatment-based classification system used for patients that presented at the spine unit of the physiotherapy department of the University of Port Harcourt Teaching hospital.

Material and methods: Data for this retrospective study were obtained from the case notes of the patients and documented into a spreadsheet specifically designed for the study. These include

demographic factors, history of LBP, physician diagnosis (if available), physiotherapy diagnosis, treatments offered and further signs/symptoms (flags). Data obtained were summarized using descriptive statistics of mean, frequency counts and percentages

Results: Data of a total of 86 patients treated for complaints of low back pain were utilized in this study. The male to female ratio was 1:1.77 with age range between 16 to 65 years. Most patients were females, adults and were civil servants. Majority presented with a variety of accompanying complaints such as pain in one or both legs. The global stabilization component of motor control and function optimization was the intervention of choice as most patients fell into this treatment category following the outcome of classification with only one per cent requiring manipulation.

Conclusion: Record-keeping in the clinic need to be enhanced especially in the presence of comorbidities in determining which patients are fit for standard rehabilitation and which should be

attended to along with or restricted to only medical management are being recorded. Also, results of this study indicate the need to be pay primary prevention of LBP in working population to forestall its occurrence.

Keywords: low back pain, treatment-based classification, stabilization, manipulation

Introduction

Approximately about 85% of primary health consultations presents with “non-specific” back pain wherein the specific underlying disease or pathology remains unidentified¹. Low back pain (LBP) is considered a public health issue as it affects everyone regardless of age, gender or socioeconomic status^{2,3}. A systematic review of the prevalence of low back pain in Africa revealed the average lifetime prevalence of LBP among adolescents was 36% and among adults was 62%⁴. Among men and women, there are mixed findings on the prevalence of LBP. While a study by Wang et al.⁵ reported that females had a higher prevalence of LBP across all age groups, similar prevalence rates among women and men have also been reported⁶.

Historically, LBP was perceived as a problem confined to western countries, but research performed during the one and a half-decade ago clearly showed that it is also a significant problem in low- and middle-income countries^{7,8,9,10}. Commonly reported risk factors associated with low back pain are personal factors, work factors and environmental factors¹¹. Personal factors consist of age, gender, body mass index, work time, smoking, educational status, levels of income, activity and trauma. Work factors include heavy workload, work position, repetition, and duration. It was found that continuous sitting significantly increased perceived discomfort (particularly in the upper and lower back), trunk flexion and metrics of localized muscle fatigue^{12,13}. Heavy workload on workers is a leading

cause of low back pain. Environment factors are noises and whole-body vibration. More so, commonly reported personal risk factors include low educational status, stress, anxiety, depression, job dissatisfaction, low levels of social support in the workplace, whole-body vibration, tobacco use and poor general health or functional level^{14,15}. Also, studies reported that the obese have an increased risk of developing back pain and that the rate of obesity increases with age at least up to 50 or 60 years old^{16,17,18}.

Likewise, although LBP is considered a major cause of morbidity in high, middle and low-income countries, yet, to date, research on effective interventions has been relatively under-prioritized and under-funded. One important reason may be the low ranking it has received relative to many other conditions included in the previous Global Burden of Disease studies, due in part to the paucity of suitable data^{15, 19}. In 2019, LBP was ranked eight (47%) amongst the top ten contributors to increasing health loss worldwide over the past thirty years, measured as the largest absolute increases in the number of disability-adjusted life years (DALY)¹⁰. It has been demonstrated that diagnosis, as noted in the patients' medical records, has been used to estimate the prevalence of LBP in the real-world²⁰. It is therefore hoped that this study will add to the body of knowledge in this regard.

Despite the feats already achieved in the study of low back pain, most of the literature demonstrates difficulty with finding a specific cause of low back pain and this is suggestive of clinical guidelines which lack evidence-based means of identifying the intervention being put into practice by clinicians. For patients with acute, work-related low back pain, the use of the treatment based classification approach resulted in improved disability and return to work status after four weeks, as compared with

therapy based on clinical practice guidelines²¹. The Treatment based classification (TBC) system of low back pain management, a concept which uses high-level evidence in assessing, evaluating and planning treatments has been demonstrated to be effective and efficient^{22,23}. Applying this method, patients are grouped into one of four treatment categories: Stabilization category, Passive mobilization and manipulation category, Specific exercise category or Sustained positions or traction category to guide an effective clinical decision making process. In the study presented here this original classification was the mode used in categorization. This primary purpose of the TBC has been updated and modified. The current TBC has two levels of triage, the level of the first contact health care provider competent in LBP care charged with the responsibility of determining the appropriate approach of management²⁴ and the level of the rehabilitation provider.

In the first level of triage, the patient is screened for and cleared of any serious pathology and placed in either rehabilitation or self-care management. Risk profiling instruments such as the STarT Back Tool are used to determine patients who will benefit from self-care management²⁵. Such patients are predicted unlikely to develop disabling LBP during the current episode. The second level is determining appropriate rehabilitation management determined by symptom modulation during presentation and history taking with recent symptoms/signs or recurrent episodes of LBP that is currently causing significant symptomatic features, decision is made on they benefit from intervention with the use of manual therapy, directional preference exercises, traction or immobilization to modulate pain.

The rehabilitation professional through assessment determines where patients might fit. the criteria of two or more treatment classifications, which

requires prioritization of treatment. For example, in the symptom modulation approach, a patient may satisfy the criteria for manipulation and directional exercises. In that case, directional exercises take priority over manipulation. Directional exercises should be the treatment of choice until the patient's status plateaus. At that moment, manipulation may ensue. Similarly, in the movement control approach, a patient may have motor control impairment and reduced muscle performance. In that case, motor control deficit takes priority over the muscle reduced performance. When the control deficit is corrected, muscle performance training in the form of stabilization exercises can ensue²⁴.

To guide the classification, information from the clinical examination, patients' self-reports on pain severity scale and functional disability scale, flags they seem to be presenting with (red flags: signs and symptoms related to some pathology eg endometriosis; yellow flags: psycho-social factors eg depression and green flags: related to rehabilitation intervention eg neuro-musculoskeletal) are analysed and clinical decision is arrived at based on them. Factors suggestive of flag history are deduced from subjective history and physical examination.

Treatment based classification system is the main assessment and treatment approach used in managing low back pain patients in the University of Port Harcourt (UPTH) spine clinic. The TBC system was initially proposed by Delitto et al²⁶ and has evolved over the greater part of two decades. Different revisions have been attempted since then with Alrwaily et al.²⁴ adding considerations for biopsychosocial aspects of low back pain. This classification system has been rigorously evaluated and has come out with moderate to good inter-rater reliability regardless of clinician experience or expertise. Managing individuals with low back pain

using a treatment-based classification approach significantly reduces disability and pain compared with current clinical practice guideline standards²⁷ and enhance clinical decision making²⁸. The treatment-based classification approach has been validated²⁸ and is widely used in the United States of America.

Even though LBP has since 1990 ranked number one leading cause of disability by the Global Burden of Disease Study²⁹, it has not been identified as a priority area for non-communicable disease management³⁰. With a focus on getting the needed attention on the prevention and management of LBP, studies in Nigeria have reported on the prevalence of LBP using self-reported measures^{31,32,33}. However, to our knowledge, no published research has reported the prevalence and risk factors of LBP using a patient's case note in a hospital in the south-south part of Nigeria. Hence, specific information on associated risk factors in LBP, its assessment and physiotherapy treatment patterns from the patient's case notes are needed for evidence-based interventions aimed at reducing musculoskeletal complaints to be better targeted.

Methodology

A retrospective study of specifically selected hospital records of individuals attending the spine subunit of the orthopaedic unit in the Physiotherapy Department, of the University of Port Harcourt Teaching Hospital, Port Harcourt, Nigeria. This subunit is an outpatient clinic that is run by Certified Spine Specialists who manage patients presenting with spinal pain, and also involved in training students, interns and physiotherapists on rotations. The study utilized case notes of patients who were treated for low back pain in the unit. To carry out this study, case notes of the patients managed in the unit between January 2013 to June 2019 were retrieved,

from which the cases of low back pain were identified and reviewed.

Information obtained from the case notes were then recorded into a spreadsheet specifically designed for the study, these were: hospital number, sex, age, a major complaint of the patient at presentation to the unit, low back pain, physician diagnosis (if available), physiotherapy diagnosis, and treatments offered. Further signs/symptoms (flags), LBP treatment classification, and treatment sessions were extracted. Presenting patients were grouped based on Flags -red, yellow and green. Collected data were collated and summarized using mean and percentages. Continuous variables (e.g., age) were presented in means and standard deviation, while categorical variables (e.g., sex, flags) were represented in percentages and frequencies.

Results

A total of 86 case reports of patients that had presented for LBP were obtained for data extraction. Out of these, the rehabilitation treatment approach/impression involved in the physiotherapy management of 78% (67) of the patients were indicated. The remaining case reports were, however, included in the analysis to determine the population of patients that were attended to in the unit during the period under consideration.

The respondents' backgrounds are summarized in table 1. The male patients were (n=31, 36%) and the female patients were (n=55, 64%). The participants' ages ranged from 13 to 77 years. The majority of the patients were either overweight 16(18.6%) or obese 25(29.1%). Thirty eight (44.2%) were civil servants, followed by 31(36%) traders. The predominant age group 23(27.4%) was the age group between 51 and 60.

The presentation pattern of LBP in this study is presented in Table 2. The patients managed with stabilization were the majority 57(66.3%) while only one individual (1.2%) fell under the class of manipulation. Most cases were reported in March 2019.

Table 1. Socio-demographic characteristics of participants (N = 86)

Variables	Frequency	Percentage (%)
<i>Age category</i>		
-	7	8.3
31-40	16	19.0
41-50	17	20.2
51-60	23	27.4
61-70	18	21.4
71-80	3	3.6
<i>Sex</i>		
Male	31	36
Female	55	64
<i>Occupation</i>		
Student/Applicant	6	7.0
Business/Trade	31	36.0
Civil Servant	38	44.2
Retiree	9	10.5
<i>Body mass index category</i>		
<18	1	1.2
18-24	2	2.3
25-29	16	18.6
30 and above	25	29.1
<i>Flag</i>		
Red	41	47.7
Yellow	7	8.1
Green	25	29.1

Table 2. Prevalence of LBP from January 2013 to June 2019 among Patients Visiting the Spine Unit of the Physiotherapy Department, UPTH (N = 86)

	Frequency	Percentage (%)
<u><i>Treatment based classification</i></u>		
<u><i>(Impression)</i></u>		
Stabilization	57	66.3
Others (Unidentified)	19	22.1
Traction	5	5.8
SCI	4	4.7
Manipulation	1	1.2
<u><i>Month</i></u>		
January	5	5.8
February	6	7
March	12	14
April	10	11.6
May	11	12.8
June	6	7
July	6	7
August	4	4.7
September	2	2.3
October	1	1.2
November	11	12.8
December	6	7
<u><i>Year</i></u>		
2013	1	1.2
2014	4	4.7
2015	2	2.3
2016	5	5.8
2017	21	24.4
2018	18	20.9
2019	28	32.6

Discussion

Low back pain has been described as the most common musculoskeletal disorder affecting the general population^{32,34}. As part of the Global Burden of Disease Study (GBD) 2019, the Expert Group demonstrated that low back pain is one of the top ten high burden diseases and injuries, with an average number of disability-adjusted life years (DALYs) higher than HIV, road injuries, tuberculosis, lung cancer, chronic obstructive pulmonary disease and preterm birth complications¹⁰. The prevalence of low back pain has been reported to vary according to definitions, study populations and also from country to country⁹. A systematic review of the prevalence of low back pain in Africa revealed the average lifetime prevalence of LBP among adolescents was 36% and among adults was 62%⁴. Though not carried out in the general population, adults still form the larger percentage of individuals attended to in the spine clinic during the study period with close to 50% of number recorded being in the overweight category. Studies have reported likely relationship between overweight, obesity and LBP; the obese have an increased risk of developing back pain and that the rate of obesity increases with age at least up to 50 or 60 years old^{35,36}. These studies' findings agree with ours as shown by the majority of individuals being adults in different overweight categories.

Among men and women, there are mixed findings on the prevalence of LBP. While a study by Wang et al.⁵ which agrees with the present study reported that females had a higher prevalence of LBP across all age groups, similar prevalence rates among women and men have also been reported⁶. The assertion by Duthey et al³⁷ that LBP is present at any age, from children to the elderly and is a common reason for medical consultations is evident in this study as most

age groups are represented in this study. Studies have found the incidence of low back pain is highest in the 30-year-olds, the overall prevalence increases with age until the 60-65 year age group and then gradually declines^{15,38,39}. The majority of individuals treated in the spine clinic were 31 to 70 years which encompass the general working population of the country. This is further evident by the 80.2% of the patients who were civil servants and in trade occupations.

In addition to age and gender, the risk factors and impact of low back pain on an individual's quality of life and productivity, as a matter of necessity have been given some attention in the literature^{31,9,32}. This aspect is referred to as flags in this study. Unfortunately, specific details of diagnosis or factors were not clearly detailed. For instance, the individuals (47.7%) who were reported to present with comorbidities labelled as red flags and yellow flags with no clear record of how these were defined or managed is an identified limitation of this study. LBP with attendant complexities is reported to be a major cause of decreased efficiency and well-being in the working populace³², its various consequences such as financial instability, increased medical costs, and other socioeconomic implications affecting individuals, employers of organizations, and society at large⁴⁰. Indeed, the burden of LBP is immense with regards to the quality of life, productivity, and employee absenteeism, making these common conditions the single most significant contributor to musculoskeletal disability worldwide^{19,9}.

Stabilization was the major treatment method employed in the management of the patients. Lumbar stabilization targets the local stabilisers in the lumbar region especially the lumbar multifidus

muscle in synergy with other muscles of core stabilization using bracing methods. The stabilization method was employed in the management of most of the patients reported in the study by de Oliveira et al⁴¹ which agrees with our study. This method as described by Smith et al⁴² has strong evidence and not more effective than any other form of active exercise in the long term. The 12% treated with the same method in Burns et al.²⁸ is at variance with ours. This could be due to similarity in the age bracket attended to in the earlier versus the largely geriatric population in the latter. Manipulation was the least applied approach in our study, and this is related to the view in the study by de Oliveira et al.⁴¹ in which only 5.13% were treated with manipulation. This is likely because most of the participants in their study just like those in our current study had symptoms which have lasted more than 16 days since onset.

Conclusion

This study indicates that low back pain was a common health problem among the patients visiting the spine unit of the physiotherapy department in the University of Port Harcourt Teaching Hospital studied. It was more prevalent in the middle age brackets, among females and civil servants. The findings of this study suggest that primary prevention of LBP should be considered especially by forestalling conditions that may affect the spine. There is a need to enhance record-keeping in the clinic and take into consideration the comorbidities in determining which patient are fit for standard rehabilitation and which should be restricted to only medical management.

References

1. Deyo RA, Weinstein JN. Low back pain. *The New England Journal of Medicine*. 2001; 344(5): 363-70. doi: 10.1056/NEJM200102013440508.
2. Davies C, Nitz AJ, Mattacola CG et al. Practice patterns when treating patients with low back pain: A survey of physical therapists. *Physiotherapy Theory and Practice*, 2014; 30(6), 399-408. <https://doi.org/10.3109/09593985.2013.877547>
3. Gakuu LN. A Brief History of Low Back Pain: Yesterday-Today-Tomorrow. *East African Orthopaedic Journal*, 2015; 9(1), 3-5.
4. Louw QA, Morris LD, Grimmer-Somers K. The Prevalence of low back pain in Africa: A systematic review. *BMC Musculoskeletal Disorders*, 2007; 8, 1-14. <https://doi.org/10.1186/1471-2474-8-105>
5. Wáng YX, Wáng JQ, Káplár Z. Increased low back pain prevalence in females than in males after menopause age: evidences based on synthetic literature review. *Quant Imaging Med Surg*. 2016;6(2):199-206. doi:10.21037/qims.2016.04.06
6. Anderson LA, Slonim A, Yen IH, et al. Developing a Framework and Priorities to Promote Mobility Among Older Adults. *Health Education and Behavior*, 2014; 41(1-suppl), 10S-18S. <https://doi.org/10.1177/1090198114537492>
7. Omokhodion FO, Sanya, AO. Risk factors for low back pain among office workers in Ibadan, Southwest Nigeria. *Occupational Medicine*, 2003; 53(4), 287-289.

- <https://doi.org/10.1093/occmed/kqg063>
8. Omokhodion FO. Low back pain in an urban population in Southwest Nigeria. *Tropical Doctor*, 2004; 34(1), 17–20. <https://doi.org/10.1177/004947550403400107>
 9. Abebe AD, Gebrehiwot EM, Lema, S, Abebe TW. Prevalence of Low Back Pain and Associated Risk Factors Among Adama Hospital Medical College Staff, Ethiopia. *European Journal of Preventive Medicine*, 2015; 3(6), 188–192. <https://doi.org/10.11648/j.ejpm.20150306.15>
 10. Vos T. Global burden of 369 diseases and injuries in 204 countries and territories, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019, *Lancet* 2020; 396: 1204–22
 11. Andini F. Risk Factors of Low Back Pain in Workers. *Journal of Majority*, 2015; 4(1), Halaman 11-19.
 12. Obembe AO, Johnson OE, Tanimowo TO, Onigbinde AT, Emechete AA. Musculoskeletal pain among undergraduate laptop users in a Nigerian University. *Journal of Back and Musculoskeletal Rehabilitation*, 2013; 26(4), 389–395. <https://doi.org/10.3233/BMR-130397>
 13. Bochen J, Maury AN. Influences of continuous sitting and psychosocial stress on low back kinematics, kinetics, discomfort, and localized muscle fatigue during unsupported sitting activities, *Ergonomics*, 2018; 61:12, 1671-1684, DOI:10.1080/00140139.2018.1497815
 14. Hoy D, Brooks P, Blyth, F, Buchbinder, R. The Epidemiology of low back pain. *Best Practice and Research: Clinical Rheumatology*, 2010; 24(6), 769–781. <https://doi.org/10.1016/j.berh.2010.10.002>
 15. Manchikanti L, Singh V, Datta S, Cohen SP, Hirsch JA. Comprehensive review of epidemiology, scope, and impact of spinal pain. *Pain Physician*, 2009; 12(4), 35–70.
 16. Kostova V, Koleva M. Back disorders (low back pain, cervicobrachial and lumbosacral radicular syndromes) and some related risk factors. *Journal of the Neurological Sciences*, 2001; 192(1–2), 17–25. [https://doi.org/10.1016/S0022-510X\(01\)00585-8](https://doi.org/10.1016/S0022-510X(01)00585-8)
 17. Mirtz TA, Greene L. Is obesity a risk factor for low back pain? An example of using the evidence to answer a clinical question. *Chiropractic and Osteopathy*, 2005; 13. <https://doi.org/10.1186/1746-1340-13-2>
 18. Odebiyi D, Olawale OA, Olatona FA. Prevalence and effect of back pain in obese adults in Lagos Nigeria. Prevalence of Low Back Pain and its Association with Age and Sex among Obese Individual of an Adult Population in Nigeria. *Journal of Basic Medical Sciences UNILAG Nigeria*, 2019. <https://jbms.unilag.ng/index.php/jbms/article/download/40/40>
 19. Maiyaki M, Garbati, M. The burden of non-communicable diseases in Nigeria; In the context of globalization. *Annals of African Medicine*, 2014; 13(1), 1–10 <https://doi.org/10.4103/1596-3519.126933>
 20. Fatoye F, Gebrye T, Odeyemi, I. Real-world incidence and prevalence of low back pain using routinely collected data. *Rheumatology International*, 2019; 39(4),

- 6 1 9 – 6 2 6 .
<https://doi.org/10.1007/s00296-019-04273-0>
21. Fritz JM, Delitto A and Erhard RE. Comparison of classification-based physical therapy with therapy based on clinical practice guidelines for patients with acute low back pain. A randomised clinical trial. *Spine*, 2003; 28: 1363–1372.
22. Foster N. Therapeutic Exercise for Spinal Segmental Stabilization in Low Back Pain: Scientific Basis and Clinical Approach. *Physical Therapy Reviews*, 2000; 5(4), 2 4 7 – 2 4 8 .
<https://doi.org/10.1179/108331900786166597>
23. Fritz JM, Cleland JA, Childs JD. Subgrouping patients with low back pain: Evolution of a classification approach to physical therapy. *Journal of Orthopaedic and Sports Physical Therapy*, 2007; 37(6), 2 9 0 – 3 0 2 .
<https://doi.org/10.2519/jospt.2007.2498>
24. Alrwaily M, Timko M, Schneider M, et al. Treatment-Based Classification System for Low Back Pain: Revision and Update, *Physical Therapy*, 2016; 96(7), 1057–1066.
<https://doi.org/10.2522/ptj.20150345>
25. Hill, JC., Whitehurst, DG., Lewis, M. et al, Comparison of stratified primary care management for low back pain with current best practice (STarT Back): a randomised controlled trial. *Lancet (London, England)*, 2011 378(9802), 1560–1571.
[https://doi.org/10.1016/S0140-6736\(11\)60937-9](https://doi.org/10.1016/S0140-6736(11)60937-9)
26. Delitto A, Erhard RE, Bowling RW. A treatment-based classification approach to low back syndrome: identifying and staging patients for conservative treatment. *Physical Therapy*, 1995; 75(6):470-489
27. Herbert JJ, Koppenhaver SL, Walker BF. Subgrouping patients with low back pain: a treatment-based approach to classification. *Sports Health*. 2011; 3(6):534-42.
28. Burns SA, Foresman E, Kraycsir SJ, Egan W, Glynn P, Mintken PE, Cleland JA. A treatment-based classification approach to examination and intervention of lumbar disorders. *Sports Health*, 2011; 3(4): 362-72. doi: 10.1177/1941738111410378.
29. Wu A, March L, Zheng X et al. Global low back pain prevalence and years lived with disability from 1990 to 2017: estimates from the Global Burden of Disease Study 2017. *Ann Trans Med* 2020; 8(6): 299-313.
30. Briggs AM, Woolf AD, Dreinhöfer K, et al. Reducing the global burden of musculoskeletal conditions. *Bull World Health Organ*. 2018; 96(5):366-368. doi:10.2471/BLT.17.204891
31. Ogunbode AM, Adebuseye LA, Alonge TO, Ogunbode A. Prevalence of low back pain and associated risk factors amongst adult patients presenting to a Nigerian family practice clinic, a hospital-based study. *Afr J Prm Health Care Fam Med*, 2013; 5(1), 1–8. <https://doi.org/10.4102/phcfm.v5i1.441>
32. Ahmad A, Saidu I, Ahmad RY. Prevalence and Risk Factors for Low Back Pain Among Professional Drivers in Kano, Nigeria. *Archives of Environmental and Occupational Health*, 2015; 70(August), 2 5 1 – 2 5 5 .
<https://doi.org/10.1080/19338244.2013.845139>

33. Elloker T, Rhoda A, Arowoiya A, Lawal IU. Factors predicting community participation in patients living with stroke, in the Western Cape, South Africa. *Disability and Rehabilitation*, 2018; 0(0), 1–8. <https://doi.org/10.1080/09638288.2018.1473509>
34. Okonkwo CA, Ibikunle PO, Umunnah JO, et al. Factors Influencing the Use of Outcome Measures for Patients with Low Back Pain: A Survey of Nigerian Physiotherapists. *Open Journal of Therapy and Rehabilitation*, 2020; 08(03), 83–97. <https://doi.org/10.4236/ojtr.2020.83008>
35. Kostova, V., & Koleva, M. Back disorders (low back pain, cervicobrachial and lumbosacral radicular syndromes) and some related risk factors. *Journal of the neurological sciences*, 2001; 192(1-2), 17–25. [https://doi.org/10.1016/s0022-510x\(01\)00585-8](https://doi.org/10.1016/s0022-510x(01)00585-8)
36. Mirtz, TA., & Greene, L. (2005). Is obesity a risk factor for low back pain? An example of using the evidence to answer a clinical question. *Chiropractic & osteopathy*, 13(1), 2. <https://doi.org/10.1186/1746-1340-13-2>
37. Duthey B, Priority Medicines for Europe and the World "A Public Health Approach to Innovation" Update on 2004 Background Paper Background Paper 6.24 Low back pain. 2013
38. Hurwitz EL, Morgenstern, H. Correlates of back problems and back-related disability in the United States. *Journal of Clinical Epidemiology*, 1997; 50(6), 669–681. [https://doi.org/10.1016/S0895-4356\(97\)00018-8](https://doi.org/10.1016/S0895-4356(97)00018-8)
39. Kopec AJ, Sayre CE, Esdaile MJ. Predictors of Back Pain in a General Population Cohort: Point of View. *Spine*, 2004; 29(1), 77–88. <https://doi.org/10.1097/01.BRS.0000103671.81851.1D>
40. Coombs DM, Machado GC, Richards B, Wilson R, Chan J, Storey H, Maher CG. Healthcare costs due to low back pain in the emergency department and inpatient setting in Sydney, Australia. *Lancet Reg Health West Pac*. 2021 Jan 29;7:100089. doi: 10.1016/j.lanwpc.2020.100089.
41. de Oliveira IO, de Vasconcelos RA, Pilz B, Teixeira PEP, de Faria Ferreira E, Mello W, Grossi DB. Prevalence and reliability of treatment-based classification for subgrouping patients with low back pain. *J Man Manip Ther*. 2018; 26(1):36-42. doi: 10.1080/10669817.2017.1350328.
- Smith, B. E., Littlewood, C., May, S. An update of stabilization exercises for low back pain: A systematic review with meta-analysis. *BMC Musculoskeletal Disorders*, 2014; 15(1). <https://doi.org/10.1186/1471-2474-15-416>