Khalsa JH, et al., J Addict Addictv Disord 2021, 8: 060
DOI: 10.24966/AAD-7276/100060

HSOA Journal of Addiction & Addictive Disorders

Short Review

Myths and Realities about CBD as Medicine

Khalsa JH[1]*, Bunt GC[2] and Maggirwar SB[3]

[1]*Department of Microbiology, Immunology, and Tropical Medicine, The George Washington University School of Medicine and Health Sciences, Washington, DC, USA*

[2]*American Board of Psychiatry and Neurology, NYU Medical School, New York, USA*

[3]*The George Washington University School of Medicine and Health Sciences, Washington, DC, USA*

Abstract

The two cannabinoids from the plant Cannabis sativa, Linn., Cannabidiol (CBD) and delta-9 Tetrahydrocannabinol (THC) have been extensively studied for their pharmacologic activities and therapeutic potential. CBD is being extensively promoted as medicine for the treatment of a wide range of clinical conditions ranging from neurological, mental, to numerous health conditions. The available research shows that it is all a myth that CBD can safely and effectively treat health conditions involving almost every physiological system as promoted. The reality is that research from well-designed clinical studies and trials show that CBD can safely and effectively treat only one type of rare and severe type of epilepsy, known as Lennox-Gastaut/Dravet syndrome, in young children for which it has been approved by the US FDA. In combination with THC known as Sativex, it is approved in 25 countries including Canada, except the United States, for treating symptoms of multiple sclerosis including muscle spasticity, pain and sleep disturbances. Therefore, it is important that addiction psychiatrists and other addiction health care professionals play an important role in educating their patients that there is insufficient data to support CBD as medicine for treating clinical indications for which it is being promoted.

Keywords: Cannabidiol; CBD; Myths; Realities

***Corresponding authors:** Khalsa JH, Department of Microbiology, Immunology, and Tropical Medicine, The George Washington University School of Medicine and Health Sciences, Washington, DC, USA, Tel: +1 7034756727; E-mail: jkhalsa@yahoo.com

Citation: Khalsa JH, Bunt GC, Maggirwar SB (2021) Myths and Realities about CBD as Medicine. J Addict Addictv Disord 8: 060.

Received: March 15, 2021; **Accepted:** March 23, 2021; **Published:** March 30, 2021

Introduction

Cannabis sativa Linn is a complex plant that contains 525 identified and characterized chemicals, of which 104 are classified as cannabinoids [1], while the rest are terpenes and flavonoids. Only two cannabinoids-- delta-9-tetrahydrocannabinol (THC) and Cannabidiol (CBD)-have been extensively studied for their potential therapeutic applications. In this commentary, we will present the most current data and show whether CBD as medicine, being promoted for the treatment of a wide range of clinical indications, is a myth or a reality.

CBD is a non-psychoactive chemical constituent of cannabis [2] that acts via CB2 receptors in the body. Mannucci et al., [3] reviewed the literature and concluded that for CBD's non-addictive, anti-inflammatory, neuroprotective, and antioxidant properties, this molecule alone or in combination with THC, could be beneficial in treating Parkinson's disease, Alzheimer's disease, Multiple Sclerosis (MS), Huntington's disease, Amyotrophic Lateral Sclerosis (ALS), and cerebral ischemia, but recommend additional clinical trials to confirm its use in each of these neurological conditions. Data from numerous small clinical studies and clinical trials show that CBD alone or in combination with THC also has a potential to treat anxiety, depression, and many other non-CNS conditions like heart disease, acne, inflammation, liver disease and cancer.

The reality is that CBD can be safely and effectively used for the treatment of rare and severe forms of epilepsy-Lennox-Gastaut syndrome and Dravet syndrome in children two years of age and older (https://www.fda.gov/newsevents/newsroom/pressannouncements/ucm611046.htm). This was based on the anticonvulsant action of CBD that was confirmed in several small clinical studies [4] and large randomized, double-blind, placebo-controlled clinical trials [5-7]. In a survey of parents of children with treatment resistant epilepsy, it was found that CBD treatment reduced the frequency of seizures in 84% of respondents. In a randomized, dose-range safety trial in patients with Dravet syndrome, the plasma levels of CBD and its metabolites were dose-related at 2, 5, and 10 mg/kg/day doses respectively; and CBD was well tolerated with side effects like pyrexia, somnolence, decreased appetite, sedation, vomiting, ataxia and abnormal behavior [6]. Data from well planned and designed studies also clearly showed that CBD (Epidiolex) reduced the frequency of convulsions (tonic-clonic, tonic, clonic and atonic) seizures in patients with Dravet and Lennox-Gastaut syndromes [6,7]. CBD tested in a 12-wk trial in patients with treatment resistant epilepsy also reduced the frequency of seizures [8]. CBD treatment also improved the energy level, memory, control/helplessness, cognitive function, social interaction and general global quality of life of children with epilepsy [9]. It is important to note that of the 102 clinical trials registered in www.cliniclatrials.gov, 26 trials are studying the efficacy of CBD for the treatment of one or more types of seizures. In the case of movement disorders/multiple sclerosis, due to its anti-inflammatory effects, CBD could be used to treat MS-related movement disorders [10,11], and in combination with THC (Sativex [THC:CBD in a 1:1 ratio]),

and was effective in treating MS without adversely impairing driving performance [12], and improving mobility in patients with MS [13]. Incidentally, Sativex is approved in 25 countries including Canada but not in the United States for treating MS-related neuropathic pain, sleep disturbances and muscle spasticity. This is where the reality ends.

There are several myths that CBD can be used to treat a wide range of clinical conditions including neurological/mental conditions, drug use, and inflammatory disorders as mentioned above. In the case of schizophrenia, although preclinical and clinical studies show that CBD could treat schizophrenia, psychosis [14], hallucinations, delusions, negative symptoms of schizophrenia such as lack of emotion, loss of social functioning [15], and though CBD is well tolerated with no worsening of mood, suicidality, it was ineffective at 600 mg/day in treating the cognitive impairment and other neuropsychiatric complications see in patients with schizophrenia [16]. Khoury et al., [17] reviewed the literature and concluded that there was no strong evidence to support CBD use in psychiatry at this time and those large well-designed clinical trials are required to assess the effects of CBD in psychiatric disorders. Regarding Alzheimer's and Parkinson's diseases, data from small clinical studies with a few patients show that CBD could be used to treat sleep disorders and improve the quality of life in patients with Parkinson's disease [18], and psychosis [19] without serious adverse effects. However, a significant amount of research from clinical studies and trials is needed to support its use in treating Alzheimer's and Parkinson's diseases [3]. In the case of spinal cord or traumatic brain injuries, studies in rats showed that CBD applied immediately to the damaged spinal cord minimized the extent of damage and improved the quality of movement in rats [20], but there are no clinical studies to support its use in treating spinal cord and traumatic brain injuries in humans. Similarly, because of its neuroprotective effects seen in animal studies [21] where CBD protected neurons following an injury, it could be developed to treat traumatic brain injury in humans. Similarly, research in rats [22] and mice [23] show that CBD protected against brain damage seen in stroke. However, there are no data from studies in humans that CBD would be effective in treating stroke in humans.

CBD appears to be a promising drug to treat anxiety disorders including opiate use disorder, panic disorders, generalized anxiety disorder, PTSD, and social anxiety disorder and opiate withdrawal [24]. Several anecdotal reports also support the benefits of CBD for treating anxiety. Since CBD activates the endocannabinoid system by increasing levels of naturally occurring cannabinoids, such as anandamide, research suggests that changes in the endocannabinoid system may be involved in depression and therefore, CBD could treat depression. Further, CBD acts as an antidepressant by acting on serotonin pathways in the brain [25] and it can specifically reduce anhedonia, a symptom of depression that makes people unable to feel joy or happiness [26]. Since anxiety and depression occur in bipolar disorder, CBD may stabilize mood in bipolar disorder too [27]. However, CBD failed to improve acute manic episodes of bipolar in patients with mania [26], even though animal research suggested that CBD could protect mania-related brain damage [27]. Additional research is needed to support the use of CBD for treating depression.

Regarding sleep disorders, although CBD was effective in promoting wakefulness in rats via triggering increased levels of dopamine in areas of the brain responsible for wakefulness [28] suggesting that CBD could promote wakefulness in disorders causing excessive sleepiness, such as narcolepsy. But in only one case report, CBD improved the quality and quantity of sleep in a 10-year-old young patient with PTSD, most likely due to its anxiety-relieving benefits [29]. Therefore, more clinical research is needed to support its use in treating sleep disorders in humans.

Preclinical research suggests that CBD could treat inflammatory diseases of the gut such as colitis, inflammatory bowel disease and Crohn's disease. CBD at 10 mg/d, po, was safe but not effective in treating Crohn's disease, possibly due to small dose of CBD, the smaller number of patients, or lack of synergism with other cannabinoids, and suggested further investigation. CBD may be effective in treating chronic pain, arthritic pain, cancer-related pain, but the potential benefits of cannabis-based medicine in chronic neuropathic pain might be outweighed by their potential harms [30], and there is inadequate evidence for supporting the use of cannabinoids (dronabinol, nabilone, medical cannabis, or THC/CBD spay) in the treatment of cancer pain, pain of rheumatic or GI origin [31].

Preclinical research showing antiemetic effects of CBD in animals suggests that CBD may stop nausea and vomiting in patients that are not getting relief from prescribed anti-nausea drugs. But additional research is needed to support CBD use in treating nausea and vomiting in humans. Although smoked cannabis increases appetite and weight gain in patients with HIV/AIDS without affecting viral load [32], and the oral THC also increased the weight gain in patients with cachexia (extreme loss of weight), there are no studies to show that CBD stimulates appetite in humans.

CBD has been tested to treat tobacco, opiate, and/or cannabis use disorders. CBD decreased the number of cigarettes smoked [33] and reduced the salience and pleasantness of cigarette cues at a single dose of 800 mg but did not influence tobacco craving or withdrawal or any subjectively rated side effects [34]. CBD plus THC (Sativex) combined with Motivational Enhancement Therapy and Cognitive Behavioral Therapy (MET/CBT) was well tolerated and reduced cannabis use and craving but not withdrawal symptoms in chronic cannabis users [35]. Additional research is needed to determine if CBD alone or as an adjunct could be used to treat cannabis dependence. In a small clinical trial, CBD reduced the cue-induced craving and anxiety in people with opiate use disorder [36], but the investigators suggested that large clinical trials are needed to confirm the efficacy of CBD in treating opiate use disorder. The National Academy of Sciences (2018) [37] also suggests that CBD has a potential to treat a wide range of health ailments.

Conclusion

There is no doubt that CBD has a great potential to treat a wide range of clinical conditions/diseases, but as discussed above and elsewhere [38,39], the only reality is that CBD can safely and effectively treat a rare and severe form of epilepsy in young children, and in combination with THC, treat MS-related neuropathic pain. Whether it has been demonstrated to be effective for any and all clinical conditions as promoted, is all a myth. As recommended by National Academy of Sciences (2018) [37] and others, more systematic research and clinical trials are needed to further develop CBD as medicine by conducting well-designed clinical trials and get it approved by a regulatory agency like the US Food and Drug

Administration for its clinical use. It is also of paramount importance that the addiction physicians and psychiatrists play a role in educating their patients regarding the insufficient data to support the prescription of CBD for treating any of their mental, neurological or any other health ailment [40].

Sources of Support

JK: Self; GB: Samaritan/Day Top Village; SBM: R01NS066801; R01AG 054325

Conflicts of Interest

None for JK, GB and SBM.

Contributions

Conceived by JK, then all authors contributed equally to the manuscript.

Acknowledgement

Dr. Jag Khalsa is grateful to the US National Institute on Drug Abuse, NIH, for an opportunity to serve as a Special Volunteer at NIDA/NIH following his retirement in 2017 after serving for 30 years as the Chief, Medical Consequences of Drug Abuse and Infections Branch, NIDA.

Disclaimer

The statements in this paper are of the authors' only and do not reflect the official position of any of the authors' organizations.

References

1. ElSohly MA, Radwan MM, Gul W, Chandra S, Galal A (2017) Phytochemistry of Cannabis sativa L. Prog Chem Org Nat Prod 103: 1-36.

2. World Health Organization (2018) Cannabidiol: Pre-Review Report. World Health Organization, Geneva, Switzerland.

3. Mannucci C, Navarra M, Calapai F, Spagnolo EV, Busardò FP, et al. (2017) Neurological aspects of medical use of cannabidiol. CNS Neurol Disord Drug Targets 16: 541-553.

4. Kaplan EH, Offermann EA, Sievers JW, Comi AM (2017) Cannabidiol Treatment for Refractory Seizures in Sturge-Weber Syndrome. Pediatr Neurol 71: 18-23.

5. Thiele EA, Marsh ED, French JA, Mazurkiewicz-Beldzinska M, Benbadis SR, et al. (2018) Cannabidiol in patients with seizures associated with Lennox-Gastaut syndrome (GWPCARE4): A randomised, double-blind, placebo-controlled phase 3 trial. Lancet 391: 1085-1096.

6. Devinsky O, Patel AD, Cross JH, Villanueva V, Wirrell EC, et al. (2018) Effect of Cannabidiol on Drop Seizures in the Lennox-Gastaut Syndrome. N Engl J Med 378: 1888-1897.

7. Devinsky O, Patel AD, Thiele EA, Wong MH, Appleton R, et al. (2018) Randomized, dose-ranging safety trial of cannabidiol in Dravet syndrome. Neurology 90: 1204-1211.

8. Devinsky O, Marsh E, Friedman D, Thiele E, Laux L, et al. (2016) Cannabidiol in patients with treatment-resistant epilepsy: An open-label interventional trial. Lancet Neurol 15: 270-278.

9. Rosenberg EC, Louik J, Conway E, Devinsky O, Friedman D (2017) Quality of Life in Childhood Epilepsy in pediatric patients enrolled in a prospective, open-label clinical study with cannabidiol. Epilepsia 58: 96-100.

10. Peres FF, Lima AC, Hallak JEC, Crippa JA, Silva RH, et al. (2018) Cannabidiol as a Promising Strategy to Treat and Prevent Movement Disorders? Front Pharmacol 9: 482.

11. Libzon S, Schleider LB, Saban N, Levit L, Tamari Y, et al. (2018) Medical Cannabis for Pediatric Moderate to Severe Complex Motor Disorders. J Child Neurol 33: 565-571.

12. Celius EG, Vila C (2018) The influence of THC:CBD oromucosal spray on driving ability in patients with multiple sclerosis-related spasticity. Brain Behav 8: 00962.

13. Rudroff T, Sosnoff J (2018) Cannabidiol to Improve Mobility in People with Multiple Sclerosis. Front Neurol 9: 183.

14. Schubart CD, Sommer IE, Fusar-Poli P, de Witte L, Kahn RS, et al. (2014) Cannabidiol as a potential treatment for psychosis. Eur Neuropsychopharmacol 24: 51-64.

15. Deiana S (2013) Medical use of cannabis. Cannabidiol: a new light for schizophrenia? Drug Test Anal 5: 46-51.

16. Boggs DL, Surti T, Gupta A, Gupta S, Niciu M, et al. (2018) The effects of cannabidiol (CBD) on cognition and symptoms in outpatients with chronic schizophrenia a randomized placebo controlled trial. Psychopharmacology (Berl) 235: 1923-1932.

17. Khoury JM, Neves MCLD, Roque MAV, Queiroz DAB, Corrêa de Freitas AA, et al. (2019) Is there a role for cannabidiol in psychiatry? World J Biol Psychiatry 20: 101-116.

18. Chagas MH, Eckeli AL, Zuardi AW, Pena-Pereira MA, Sobreira-Neto MA, et al. (2014) Cannabidiol can improve complex sleep-related behaviours associated with rapid eye movement sleep behaviour disorder in Parkinson's disease patients: a case series. J Clin Pharm Ther 39: 564-566.

19. Zuardi AW, Crippa JA, Hallak JE, Pinto JP, Chagas MH, et al. (2009) Cannabidiol for the treatment of psychosis in Parkinson's disease. J Psychopharmacol 23: 979-983.

20. Kwiatkoski M, Guimarães FS, Del-Bel E (2012) Cannabidiol-treated rats exhibited higher motor score after cryogenic spinal cord injury. Neurotox Res 21: 271-280.

21. Schiavon AP, Soares LM, Bonato JM, Milani H, Guimarães FS, et al. (2014) Protective effects of cannabidiol against hippocampal cell death and cognitive impairment induced by bilateral common carotid artery occlusion in mice. Neurotox Res 26: 307-316.

22. Pazos MR, Cinquina V, Gómez A, Layunta R, Santos M, et al. (2012) Cannabidiol administration after hypoxia-ischemia to newborn rats reduces long-term brain injury and restores neurobehavioral function. Neuropharmacology 63: 776-783.

23. Hayakawa K, Mishima K, Fujiwara M (2010) Therapeutic Potential of Non-Psychotropic Cannabidiol in Ischemic Stroke. Pharmaceuticals (Basel) 3: 2197-2212.

24. Blessing EM, Steenkamp MM, Manzanares J, Marmar CR (2015) Cannabidiol as a potential treatment for anxiety disorders, Neurotherapeutics 12: 825-836.

25. de Mello Schier AR, de Oliveira Ribeiro NP, Coutinho DS, Machado S, Arias-Carrión O, et al. (2014) Antidepressant-like and anxiolytic-like effects of cannabidiol: a chemical compound of Cannabis sativa. CNS Neurol Disord Drug Targets 13: 953-960.

26. Zuardi A, Crippa J, Dursun S, Morais S, Vilela J, et al. (2010) Cannabidiol was ineffective for manic episode of bipolar affective disorder. J Psychopharmacol 24: 135-137.

27. Valvassori SS, Elias G, de Souza B, Petronilho F, Dal-Pizzol F, et al. (2011) Effects of cannabidiol on amphetamine-induced oxidative stress generation in an animal model of mania. J Psychopharmacol 25: 274-280.

28. Murillo-Rodríguez E, Millán-Aldaco D, Palomero-Rivero M, Mechoulam R, Drucker-Colín R (2006) Cannabidiol, a constituent of Cannabis sativa, modulates sleep in rats. FEBS Lett 580: 4337-4345.

29. Shannon S, Opila-Lehman J (2016) Effectiveness of cannabidiol oil for pediatric anxiety and insomnia as part of posttraumatic stress disorder: A Case Report. Perm J Fall 20: 16-005.

30. Mücke M, Phillips T, Radbruch L, Petzke F, Häuser W (2018) Cannabis-based medicines for chronic neuropathic pain in adults. Cochrane Database Syst Rev 3: CD012182.

31. Häuser W, Fitzcharles MA, Radbruch L, Petzke F (2017) Cannabinoids in Pain Management and Palliative Medicine. Dtsch Arztebl Int 114: 627-634.

32. Abrams DI, Hilton JF, Leiser RJ, Shade SB, Elbeik TA, et al. (2003) Short-term effects of cannabinoids in patients with HIV-1 infection: A randomized, placebo-controlled clinical trial. Ann Intern Med 139: 258-266.

33. Morgan CJ, Das RK, Joye A, Curran HV, Kamboj SK (2013) Cannabidiol reduces cigarette consumption in tobacco smokers: Preliminary findings. Addict Behav 38: 2433-2436.

34. Hindocha C, Freeman TP, Grabski M, Stroud JB, Crudgington H, et al. (2018) Cannabidiol reverses attentional bias to cigarette cues in a human experimental model of tobacco withdrawal. Addiction 113: 1696-1705.

35. Trigo JM, Soliman A, Quilty LC, Fischer B, Rehm J, et al. (2018) Nabiximols combined with motivational enhancement/cognitive behavioral therapy for the treatment of cannabis dependence: A pilot randomized clinical trial. PLoS One 13: 0190768.

36. Hurd YL, Spriggs S, Alishayev J, Winkel G, Gurgov K, et al. (2019) Cannabidiol for the reduction of cue-induced craving and anxiety in drug-abstinent individuals with heroin use disorder: A double-blind randomized placebo-controlled trial. Am J Psychiatry 176: 911-922.

37. National Academies of Sciences, Engineering, and Medicine, Health and Medicine Division, Board on Population Health and Public Health Practice, Committee on the Health Effects of Marijuana, An Evidence Review and Research Agenda (2017) The Health Effects of Cannabis and Cannabinoids: The Current State of Evidence and Recommendations for Research. National Academies Press (US), Washington, DC, USA.

38. Khalsa J, Bunt G, Galanter M, Wetterau N (2018) Medicinal uses of cannabis and cannabinoids. In: Miller S (ed.). The ASAM Principles of Addiction Medicine. Wolters Kluwer Health, Pennsylvania, USA.

39. Khalsa J, Bunt G, Galanter M, Wetterau N (2019) Cannabidiol as medicine: Are we there? International Addiction Review 2: 5-18.

40. Bunt G, Khalsa J, Wetterau N (2019) COMMENTARY: The addiction physician and medicinal cannabis, International Addiction Review 2: 19-21.

HERALD

Advances In Industrial Biotechnology | ISSN: 2639-5665

Advances In Microbiology Research | ISSN: 2689-694X

Archives Of Surgery And Surgical Education | ISSN: 2689-3126

Archives Of Urology

Archives Of Zoological Studies | ISSN: 2640-7779

Current Trends Medical And Biological Engineering

International Journal Of Case Reports And Therapeutic Studies | ISSN: 2689-310X

Journal Of Addiction & Addictive Disorders | ISSN: 2578-7276

Journal Of Agronomy & Agricultural Science | ISSN: 2689-8292

Journal Of AIDS Clinical Research & STDs | ISSN: 2572-7370

Journal Of Alcoholism Drug Abuse & Substance Dependence | ISSN: 2572-9594

Journal Of Allergy Disorders & Therapy | ISSN: 2470-749X

Journal Of Alternative Complementary & Integrative Medicine | ISSN: 2470-7562

Journal Of Alzheimers & Neurodegenerative Diseases | ISSN: 2572-9608

Journal Of Anesthesia & Clinical Care | ISSN: 2378-8879

Journal Of Angiology & Vascular Surgery | ISSN: 2572-7397

Journal Of Animal Research & Veterinary Science | ISSN: 2639-3751

Journal Of Aquaculture & Fisheries | ISSN: 2576-5523

Journal Of Atmospheric & Earth Sciences | ISSN: 2689-8780

Journal Of Biotech Research & Biochemistry

Journal Of Brain & Neuroscience Research

Journal Of Cancer Biology & Treatment | ISSN: 2470-7546

Journal Of Cardiology Study & Research | ISSN: 2640-768X

Journal Of Cell Biology & Cell Metabolism | ISSN: 2381-1943

Journal Of Clinical Dermatology & Therapy | ISSN: 2378-8771

Journal Of Clinical Immunology & Immunotherapy | ISSN: 2378-8844

Journal Of Clinical Studies & Medical Case Reports | ISSN: 2378-8801

Journal Of Community Medicine & Public Health Care | ISSN: 2381-1978

Journal Of Cytology & Tissue Biology | ISSN: 2378-9107

Journal Of Dairy Research & Technology | ISSN: 2688-9315

Journal Of Dentistry Oral Health & Cosmesis | ISSN: 2473-6783

Journal Of Diabetes & Metabolic Disorders | ISSN: 2381-201X

Journal Of Emergency Medicine Trauma & Surgical Care | ISSN: 2378-8798

Journal Of Environmental Science Current Research | ISSN: 2643-5020

Journal Of Food Science & Nutrition | ISSN: 2470-1076

Journal Of Forensic Legal & Investigative Sciences | ISSN: 2473-733X

Journal Of Gastroenterology & Hepatology Research | ISSN: 2574-2566

Journal Of Genetics & Genomic Sciences | ISSN: 2574-2485

Journal Of Gerontology & Geriatric Medicine | ISSN: 2381-8662

Journal Of Hematology Blood Transfusion & Disorders | ISSN: 2572-2999

Journal Of Hospice & Palliative Medical Care

Journal Of Human Endocrinology | ISSN: 2572-9640

Journal Of Infectious & Non Infectious Diseases | ISSN: 2381-8654

Journal Of Internal Medicine & Primary Healthcare | ISSN: 2574-2493

Journal Of Light & Laser Current Trends

Journal Of Medicine Study & Research | ISSN: 2639-5657

Journal Of Modern Chemical Sciences

Journal Of Nanotechnology Nanomedicine & Nanobiotechnology | ISSN: 2381-2044

Journal Of Neonatology & Clinical Pediatrics | ISSN: 2378-878X

Journal Of Nephrology & Renal Therapy | ISSN: 2473-7313

Journal Of Non Invasive Vascular Investigation | ISSN: 2572-7400

Journal Of Nuclear Medicine Radiology & Radiation Therapy | ISSN: 2572-7419

Journal Of Obesity & Weight Loss | ISSN: 2473-7372

Journal Of Ophthalmology & Clinical Research | ISSN: 2378-8887

Journal Of Orthopedic Research & Physiotherapy | ISSN: 2381-2052

Journal Of Otolaryngology Head & Neck Surgery | ISSN: 2573-010X

Journal Of Pathology Clinical & Medical Research

Journal Of Pharmacology Pharmaceutics & Pharmacovigilance | ISSN: 2639-5649

Journal Of Physical Medicine Rehabilitation & Disabilities | ISSN: 2381-8670

Journal Of Plant Science Current Research | ISSN: 2639-3743

Journal Of Practical & Professional Nursing | ISSN: 2639-5681

Journal Of Protein Research & Bioinformatics

Journal Of Psychiatry Depression & Anxiety | ISSN: 2573-0150

Journal Of Pulmonary Medicine & Respiratory Research | ISSN: 2573-0177

Journal Of Reproductive Medicine Gynaecology & Obstetrics | ISSN: 2574-2574

Journal Of Stem Cells Research Development & Therapy | ISSN: 2381-2060

Journal Of Surgery Current Trends & Innovations | ISSN: 2578-7284

Journal Of Toxicology Current Research | ISSN: 2639-3735

Journal Of Translational Science And Research

Journal Of Vaccines Research & Vaccination | ISSN: 2573-0193

Journal Of Virology & Antivirals

Sports Medicine And Injury Care Journal | ISSN: 2689-8829

Trends In Anatomy & Physiology | ISSN: 2640-7752

Submit Your Manuscript: https://www.heraldopenaccess.us/submit-manuscript