

# ***RESEARCH AT A GLANCE***



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# *Research at a Glance*

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**March 2022**

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# **PREFACE**

## **Introduction**

The library of the Central Council for Research in Homoeopathy has been circulating "Research at a Glance". The main objective is to disseminate precise information/citation about scientific articles published in various journals/magazine other than the journals subscribed by this Council.

## **Scope**

This volume covers articles on Homeopathy, Ayurveda, Unani, Yoga.

## **Arrangement of Entries**

The articles are indexed under the name of the authors, arranged in alphabetical order. The entries have been made in the following order:

Author  
Title  
Name of Journal  
year of publication; Volume (issue no.): pagination  
Abstract

## **Acknowledgement**

We are grateful to Dr. Subhash Kaushik, Director General, CCRH for his encouragement and valuable suggestions from time to time. We sincerely acknowledge the cooperation of Mrs. Nisha Adhikari, Office Assistant in compiling this bulletin.

**(Dr. O.P. Verma)**  
**Librarian**

# HOMOEOPATHY

**Adler UC, Adler MS, Padula AEM, Hotta LM, de Toledo Cesar A, Diniz JNM et al. Homeopathy for COVID-19 in primary care: A randomized, double-blind, placebo-controlled trial (COVID-simile study). J Integr Med. 2022 Mar 12:S2095-4964(22)00033-4. doi: 10.1016/j.joim.2022.03.003. Online ahead of print. PMID: 35339397**

## **Abstract:**

**Background:** Different homeopathic approaches have been used as supportive care for coronavirus disease 2019 (COVID-19) cases, but none has been tested in a clinical trial.

**Objectives:** To investigate the effectiveness and safety of the homeopathic medicine, Natrum muriaticum LM2, for mild cases of COVID-19.

**Design, setting, participants, and interventions:** A randomized, double-blind, two-armed, parallel, single-center, placebo-controlled clinical trial was conducted from June 2020 to April 2021 in Sao-Carlos, Brazil. Participants aged > 18 years, with influenza-like symptoms and positive result from a real-time polymerase chain reaction test for severe acute respiratory syndrome coronavirus 2 were recruited and randomized (1:1) into two groups that received different treatments during a period of at-home-isolation. One group received the homeopathic medicine Natrum muriaticum, prepared with the second degree of the fifty-millesimal dynamization (LM2; Natrum muriaticum LM2), while the other group received a placebo.

**Outcome measures:** The primary endpoint was time until recovery from COVID-19 influenza-like symptoms. Secondary measures included a survival analysis of the number and severity of COVID-19 symptoms (influenza-like symptoms plus anosmia and ageusia) from a symptom grading scale that was informed by the participant, hospital admissions, and adverse events. Kaplan-Meier curves were used to estimate time-to-event (survival) measures.

**Results:** Data from 86 participants were analyzed (homeopathy, n = 42; placebo, n = 44). There was no difference in time to recovery between two groups among participants who were reporting influenza-like symptoms at the beginning of monitoring (homeopathy, n = 41; placebo, n = 41; P = 0.56), nor in a sub-group that had at least 5 moderate to severe influenza-like symptoms at the beginning of monitoring (homeopathy, n = 15; placebo, n = 17; P = 0.06). Secondary outcomes indicated that a 50% reduction in symptom score was achieved significantly earlier in the homeopathy group (homeopathy, n = 24; placebo, n = 25; P = 0.04), among the participants with a basal symptom score  $\geq 5$ . Moreover, values of restricted mean survival time indicated that patients receiving homeopathy might have improved 0.9 days faster during the first five days of follow-up (P = 0.022). Hospitalization rates were 2.4% in the homeopathy group and 6.8% in the placebo group (P = 0.62). Participants reported 3 adverse events in the homeopathy group and 6 in the placebo group.

**Conclusion:** Results showed that Natrum muriaticum LM2 was safe to use for COVID-19, but there was no statistically significant difference in the primary endpoints of Natrum muriaticum LM2 and placebo for mild COVID-19 cases. Although some secondary measures do not support the null hypothesis, the wide confidence intervals suggest that further studies with larger sample sizes and more symptomatic participants are needed to test the effectiveness of homeopathic Natrum muriaticum LM2 for COVID-19.

**Gartlehner G, Emprechtlinger R, Hackl M, Jutz FL, Gartlehner JE, Nonninger JN et al. Assessing the magnitude of reporting bias in trials of homeopathy: a cross-sectional study and meta-analysis. BMJ Evid Based Med. 2022 Mar 15;bmjebm-2021-111846. doi: 10.1136/bmjebm-2021-111846. Online ahead of print. PMID: 35292534**

**Abstract:**

**Objectives:** To assess the magnitude of reporting bias in trials assessing homeopathic treatments and its impact on evidence syntheses.

**Design:** A cross-sectional study and meta-analysis. Two persons independently searched Clinicaltrials.gov, the EU Clinical Trials Register and the International Clinical Trials Registry Platform up to April 2019 to identify registered homeopathy trials. To determine whether registered trials were published and to detect published but unregistered trials, two persons independently searched PubMed, Allied and Complementary Medicine Database, Embase and Google Scholar up to April 2021. For meta-analyses, we used random effects models to determine the impact of unregistered studies on meta-analytic results.

**Main outcomes and measures:** We report the proportion of registered but unpublished trials and the proportion of published but unregistered trials. We also assessed whether primary outcomes were consistent between registration and publication. For meta-analyses, we used standardised mean differences (SMDs).

**Results:** Since 2002, almost 38% of registered homeopathy trials have remained unpublished, and 53% of published randomised controlled trials (RCTs) have not been registered. Retrospective registration was more common than prospective registration. Furthermore, 25% of primary outcomes were altered or changed compared with the registry. Although we could detect a statistically significant trend toward an increase of registrations of homeopathy trials ( $p=0.001$ ), almost 30% of RCTs published during the past 5 years had not been registered. A meta-analysis stratified by registration status of RCTs revealed substantially larger treatment effects of unregistered RCTs (SMD: -0.53, 95% CI -0.87 to -0.20) than registered RCTs (SMD: -0.14, 95% CI -0.35 to 0.07).

**Conclusions:** Registration of published trials was infrequent, many registered trials were not published and primary outcomes were often altered or changed.

This likely affects the validity of the body of evidence of homeopathic literature and may overestimate the true treatment effect of homeopathic remedies.

**Jayaraj JM, Jothimani M, Palanisamy CP, Pentikäinen OT, Pannipara M, Al-Sehemi AG et al. Computational Study on the Inhibitory Effect of Natural Compounds against the SARS-CoV-2 Proteins. Bioinorg Chem Appl. 2022 Mar 25;2022:8635054. doi: 10.1155/2022/8635054. eCollection 2022. PMID: 35340421**

**Abstract:**

COVID-19 is more virulent and challenging to human life. In India, the Ministry of AYUSH recommended some strategies through Siddha, homeopathy, and other methods to effectively manage COVID-19 (Guidelines for AYUSH Clinical Studies in COVID-19, 2020). Kabasura Kudineer and homeopathy medicines are in use for the prevention and treatment of COVID-19 infection; however, the mechanism of action is less explored. This study aims to understand the antagonist activity of natural compounds found in Kabasura Kudineer and homeopathy medicines against the SARS-CoV-2 using computational methods. Potential compounds were screened against NSP-12, NSP-13, NSP-14, NSP-15, main protease, and spike proteins. Structure-based virtual screening results shows that, out of 14,682 Kabasura Kudineer compounds, the 250395, 129677029, 44259583, 44259584, and 88583189 compounds and, out of 3,112 homeopathy compounds, the 3802778, 320361, 5315832, 14590080, and 74029795 compounds have good scoring function against the SARS-CoV-2 structural and nonstructural proteins. As a result of docking, homeopathy compounds have a docking score ranging from -5.636 to 13.631 kcal/mol, while Kabasura Kudineer compounds have a docking score varying from -8.290 to -13.759 kcal/mol. It has been found that the selected compounds bind well to the active site of SARS-CoV-2 proteins and form hydrogen bonds. The molecular dynamics simulation study shows that the selected compounds have maintained stable conformation in the simulation period and interact with the target. This study supports the antagonist activity of natural compounds from Kabasura Kudineer and homeopathy against SARS-CoV-2's structural and nonstructural proteins.

**Mathur P, Leburu S, Kulothungan V. Prevalence, Awareness, Treatment and Control of Diabetes in India From the Countrywide National NCD Monitoring Survey. Front Public Health. 2022 Mar 14;10:748157. doi: 10.3389/fpubh.2022.748157. eCollection 2022. PMID: 35359772**

**Abstract:**

**Background:** To determine the prevalence, awareness, treatment and control of diabetes mellitus (DM) and associated factors amongst adults (18-69 years) in India from the National Noncommunicable Disease Monitoring Survey (NNMS).

**Methods:** NNMS was a comprehensive, cross-sectional survey conducted in 2017-18 on a national sample of 12,000 households in 600 primary sampling

units. In every household, one eligible adult aged 18-69 years were selected. Information on NCD risk factors and their health-seeking behaviors were collected. Anthropometric measurements, blood pressure and fasting capillary blood glucose were measured. DM was defined as fasting blood glucose (FBG)  $\geq 126$  mg/dl including those on medication. Awareness, treatment, and control of DM were defined as adults previously diagnosed with DM by a doctor, on prescribed medication for DM, and FBG  $< 126$  mg/dl, respectively. The weighted data are presented as mean and proportions with 95% CI. We applied the Student t-test for continuous variables, Pearson's chi-square test for categorical variables and multivariate regression to determine the odds ratio. For statistical significance, a p-value  $< 0.05$  was considered.

**Results:** Prevalence of DM and impaired fasting blood glucose (IFG) in India was 9.3% and 24.5% respectively. Among those with DM, 45.8% were aware, 36.1% were on treatment and 15.7% had it under control. More than three-fourths of adults approached the allopathic practitioners for consultation (84.0%) and treatment (78.8%) for diabetes. Older adults were associated with an increased risk for DM [OR 8.89 (95% CI 6.66-11.87)] and were 16 times more aware of DM. Better awareness, treatment and control levels were seen among adults with raised blood pressure and raised cholesterol.

**Conclusions:** The prevalence of DM and IFG is high among adults, while the levels of awareness, treatment and control are still low in India, and this varied notably between the age groups. Multifaceted approaches that include improved awareness, adherence to treatment, better preventive and counseling services are crucial to halt diabetes in India. Also, expanding traditional systems of medicine (Ayurveda, Yoga, Naturopathy, Unani, Siddha, and Homeopathy [AYUSH]) into diabetes prevention and control practices open solutions to manage this crisis.

**Philips CA, Theruvath AH, Ravindran R. Toxic hepatitis-associated aplastic anaemia after dual homeopathic remedies and *Gymnema sylvestre* use. BMJ Case Rep. 2022 Mar 22;15(3):e247867. doi: 10.1136/bcr-2021-247867. PMID: 35318201**

**Abstract:**

Hepatitis-associated aplastic anaemia (HAAA) is a rare condition characterised by onset of acute hepatitis which is followed by development of severe pancytopenia due to bone marrow failure within 6 months. This syndrome can be precipitated by acute viral infections, but the aetiology remains unknown in the majority. Drug-induced HAAA is extremely rare and has been reported with nutritional and dietary supplements in current literature. We report the first cases of ayurvedic herbal and homeopathic remedies-associated HAAA in two patients which proved fatal in both. Evaluation of patients with acute hepatitis and severe pancytopenia must include a detailed evaluation for complementary and alternative medicine use.

**Srivastava A, Jit BP, Dash R, Srivastava R, Srivastava S. Thuja Occidentalis: an Unexplored Phytomedicine with Therapeutic Applications. Comb Chem High Throughput Screen. 2022 Mar 8. doi: 10.2174/1386207325666220308153732. Online ahead of print. PMID: 35260050**

**Abstract:**

**Background:** The current outbreak of respiratory disease due to SARS-CoV-2 has received global attention, and recent studies show various limitations, including treatment. Phytomedicine has played a prominent role in the treatment and prevention of various epidemic and pandemic diseases.

**Objective:** Here, we attempt to focus on a safe and feasible approach for Thuja occidentalis to manage and alleviate the panic of respiratory viral infection infections including COVID-19 by strengthening an individual's immunity. The relevant information was collected from the web-based databases Pubmed, Google Scholar, and MEDLINE as well as internet sources.

**Conclusion:** As an important phytomedicine and king of antipsychotics, T. occidentalis possesses a plethora of immunological properties that not only can be used effectively in the management of respiratory viral infection infections, but also have the potential to prevent the further progression of the disease. Importantly, this is only part of the approach to treatment for the current outbreak that should be considered along with other measures.



## AYURVEDA

**Abbas T, Chaturvedi G, Prakrithi P, Pathak AK, Kutum R, Dakle P et al. Whole Exome Sequencing in Healthy Individuals of Extreme Constitution Types Reveals Differential Disease Risk: A Novel Approach towards Predictive Medicine. J Pers Med. 2022 Mar 18;12(3):489. doi: 10.3390/jpm12030489. PMID: 35330488**

### **Abstract:**

Precision medicine aims to move from traditional reactive medicine to a system where risk groups can be identified before the disease occurs. However, phenotypic heterogeneity amongst the diseased and healthy poses a major challenge for identification markers for risk stratification and early actionable interventions. In Ayurveda, individuals are phenotypically stratified into seven constitution types based on multisystem phenotypes termed "*Prakriti*". It enables the prediction of health and disease trajectories and the selection of health interventions. We hypothesize that exome sequencing in healthy individuals of phenotypically homogeneous *Prakriti* types might enable the identification of functional variations associated with the constitution types. Exomes of 144 healthy *Prakriti* stratified individuals and controls from two genetically homogeneous cohorts (north and western India) revealed differential risk for diseases/traits like metabolic disorders, liver diseases, and body and hematological measurements amongst healthy individuals. These SNPs differ significantly from the Indo-European background control as well. Amongst these we highlight novel SNPs rs304447 (*IFIT5*) and rs941590 (*SERPINA10*) that could explain differential trajectories for immune response, bleeding or thrombosis. Our method demonstrates the requirement of a relatively smaller sample size for a well powered study. This study highlights the potential of integrating a unique phenotyping approach for the identification of predictive markers and the at-risk population amongst the healthy.

**Abhishek M, Rubal S, Rohit K, Rupa J, Phulen S, Gurjeet K et al. Neuroprotective effect of the standardised extract of *Bacopa monnieri* (BacoMind) in valproic acid model of autism spectrum disorder in rats. J Ethnopharmacol. 2022 Mar 25:115199. doi: 10.1016/j.jep.2022.115199. Online ahead of print. PMID: 35346813**

### **Abstract:**

**Ethnopharmacological relevance:** *Bacopa monnieri* (BM) is commonly employed in the Indian traditional system of medicines, i.e. Ayurveda. As a memory booster, antioxidant, anti-inflammatory, antipyretic, analgesic, sedative and anti-epileptic for decades.

**Aim of the study:** To evaluate the neuroprotective effect of *Bacopa monnieri* (BM) in experimental model of autism spectrum disorder (ASD) in wistar rats and explore its mechanism of action.

**Materials and methods:** BacoMind, was evaluated for its neuroprotective effect in valproic acid (VPA) model of ASD. For in-vivo study, the pregnant female wistar rats were divided in two groups; normal control (NC) and VPA group who received single dose of normal saline (0.9% or 600 mg/kg dose of VPA) respectively on gestation day (G.D) 12.5. After the birth, all pups were segregated according to the sex. All the male pups from the dams were divided into six groups: Group 1 (NC, treated with only 0.9% normal saline, group 2 (VPA, treated 600 mg/kg on G.D12.5 and normal saline from PND 23 to 43), group 3 (Risperidone 2.5 mg/kg, PND 23 to 43) and groups 4, 5 and 6 (BM 20, 40, 80 mg/kg, PND 23 to 43). All experimental groups were subjected to battery of behaviour parameters (three Chamber Sociability test, Morris Water Maze, elevated Plus Maze, open field and rota rod test), biochemical parameters such as oxidative stress (GSH, SOD, Catalase, MDA), inflammatory cytokines (IL-1 $\beta$ , IL-6, IL-10, TNF- $\alpha$ ), histopathological examination (cresyl violet staining) of hippocampus (HC) and prefrontal cortex (PFC) regions. Further, the mRNA as well as protein expression of AMPA receptor was evaluated using RT-PCR and western blot respectively to study the mechanism of the neuroprotective effect of BM. The in-silico analysis followed evaluating the binding profile of different constituents of BacoMind with AMPA receptor.

**Results:** The results of the in-vivo study indicated BM at 80mg/kg ameliorated abnormal behavioral paradigms such as social deficits, repetitive behavior, learning and memory impairments, and motor coordination. Furthermore, BM was found to have a significant anti-oxidant (increasing GSH, SOD, and catalase and decreasing MDA levels) and anti-inflammatory properties (decreasing IL-1 $\beta$ , 6, TNF-  $\alpha$ ). The histopathological score was also found to be significantly improved by BM in a dose dependent manner in both HC and PFC. In addition to this, the up-regulated mRNA as well as protein expression of AMPA receptor was significantly reduced by 80 mg/kg dose of BM in both HC and PFC. Further, the in-silico of different constituents of BacoMind with AMPA receptor showed that luteolin and apigenin showed good binding to both the competitive antagonist binding site, non-competitive antagonist binding site and allosteric modulator site while Bacosaponin C showed good binding to the non-competitive antagonist binding site.

**Conclusion:** The present study concluded that BM can be a potential candidate for ameliorating the ASD symptoms and acts via modulating the up-regulated AMPA receptor expression.

**Amarasiri SS, Attanayake AP, Mudduwa LKB, Jayatilaka KAPW. Nephroprotective mechanisms of Ambrette (*Abelmoschus moschatus* Medik.) leaf extracts in adriamycin mediated acute kidney injury model of Wistar rats. J Ethnopharmacol. 2022 Mar 23;292:115221. doi: 10.1016/j.jep.2022.115221. Online ahead of print. PMID: 35339624**

## **Abstract:**

**Ethnopharmacological relevance:** Ambrette (*Abelmoschus moschatus* Medik., Family: Malvaceae) is a common Ayurvedic herbal medicine used in the treatment of kidney-related diseases, in the forms of tea, medicated oil, medicated wine, etc., however, its nephroprotective mechanisms remain unexploited.

**Aim of the study:** To investigate the mechanisms by which the hexane (A-HE), ethyl acetate (A-EE), butanol (A-BE), and aqueous (A-WE) leaf extracts of Ambrette protect against the adriamycin-mediated acute kidney injury in Wistar rats.

**Materials and methods:** A-HE, A-EE, A-BE, A-WE, and fosinopril sodium were administered at therapeutically effective doses (55, 75, 60, 140, 0.09 mg/kg) to adriamycin-induced (5 mg/kg, ip) Wistar rats for 28 consecutive days.

**Results:** Oral administration of the selected extracts of *A. moschatus* resulted in amelioration of kidney injury as observed by the significant changes of biomarkers of kidney function in serum and in urine, biochemical parameters of oxidative stress, and inflammation in kidney homogenates ( $p < 0.05$ ). Furthermore, the administration of plant extracts caused a significant reduction in total kidney injury scores in H and E stained kidney sections ( $p < 0.05$ ). The immunohistochemical expression of the inflammatory marker, COX-2, and the pro-apoptotic marker, Bax, were attenuated and the expression of the anti-apoptotic marker, BCL-2, was increased. A-HE exerted superior nephroprotective effects over the other three extracts and the drug reference standard.

**Conclusions:** The findings revealed that Ambrette exerts promising protective effects against adriamycin-mediated acute kidney injury through antioxidant, anti-inflammatory, and anti-apoptosis pathways. A-HE might serve as a potential candidate for the development of therapeutic drug leads that will be beneficial in the treatment of acute kidney injury.

**Basharat Z, Khan K, Jalal K, Ahmad D, Hayat A, Alotaibi G et al. Silico hierarchal approach for drug candidate mining and validation of natural product inhibitors against pyrimidine biosynthesis enzyme in the antibiotic-resistant *Shigella flexneri*. Infect Genet Evol. 2022 Mar;98:105233. doi: 10.1016/j.meegid.2022.105233. Epub 2022 Jan 29. PMID: 35104682**

## **Abstract:**

*Shigella flexneri* is the main causative agent of the communicable diarrheal disease, shigellosis. It is estimated that about 80-165 million cases and > 1 million deaths occur every year due to this disease. *S. flexneri* causes dysentery mostly in young children, elderly and immunocompromised patients, all over the globe. Recently, due to the emergence of *S. flexneri*

antibiotic resistance strains, it is a dire need to predict novel therapeutic drug targets in the bacterium and screen natural products against it, which could eliminate the curse of antibiotic resistance. Therefore, in current study, available antibiotic-resistant genomes (n = 179) of *S. flexneri* were downloaded from PATRIC database and a pan-genome and resistome analysis was conducted. Around 5059 genes made up the accessory, 2469 genes made up the core, and 1558 genes made up the unique genome fraction, with 44, 34, and 13 antibiotic-resistant genes in each fraction, respectively. Core genome fraction (27% of the pan-genome), which was common to all strains, was used for subtractive genomics and resulted in 384 non-homologous, and 85 druggable targets. Dihydroorotase was chosen for further analysis and docked with natural product libraries (Ayurvedic and Streptomycin compounds), while the control was orotic acid or vitamin B13 (which is a natural binder of this protein). Dynamics simulation of 50 ns was carried out to validate findings for top-scored inhibitors. The current study proposed dihydroorotase as a significant drug target in *S. flexneri* and 4-tritriacontanone & patupilone compounds as potent drugs against shigellosis. Further experiments are required to ascertain validity of our findings.

**Blazovics A, Csorba B. Kanpo traditional medicine nowadays is still a supported therapeutic option in Japan: Kanpo preparations. Orv Hetil. 2022 Mar 6;163(10):386-392. doi: 10.1556/650.2022.32366. Print 2022 Mar 6. PMID: 35249002**

**Abstract:**

Kanpo, the traditional Japanese medicine, is based on thousands of years of Chinese healing experience. Kanpo's philosophy, however, is only partially similar to traditional Chinese medicine. Although it retains several important basic tenets, it is a simplified, positivist, and pragmatic version of aligning to Japanese culture. Kanpo is an important part of the Japanese health insurance system along with modern western therapies. Western medicine, on the other hand, is less interested in Kanpo's therapeutic options, given that traditional Chinese medicine and Ayurvedic therapies have become widespread in the world over the past few decades. Kanpo's herbal preparations are available on various commercial internet websites. Unfortunately, the composition of the formulas is generally inaccurate. The species of herbs are not identified, so not only are they misleading, but the effects of the ingredients are not known either. The article discusses the composition and effects of some of the most commonly used conventional formulas.

**Chaudhary P, Sharma R, Rawat S, Janmeda P. Antipyretic Medicinal Plants, Phytocompounds, and Green Nanoparticles: An Updated Review. Curr Pharm Biotechnol. 2022 Mar 29. doi: 10.2174/1389201023666220330005020. Online ahead of print. PMID: 35352658**

**Abstract:**

Pyrexia itself is not a terminal condition. Basically, it occurs with mild to serious diseases affecting the large population of the world. Other than a high body temperature, pyrexia is accompanied by several sickness behaviors, changes in physiological and metabolic characteristics of the body system, and alteration in the immune responses. Various allopathic drugs are available to treat pyrexia by targeting the symptom or the pathogen itself. Drug-resistance has made control and treatment of vectors more difficult. However, a large number of marginal people are obligated to utilize locally available medicinal plants for the treatment of various diseases due to limited access to synthetic drugs. Developments in the field of nanotechnology and phytochemical research towards the discovery of new antimicrobial agents have also drawn the interest of researchers towards the synthesis of green nanoparticles from the plant extracts due to their several benefits than the other methods. Thus, the present report discusses the use of ethnomedicinal plants, phytochemicals, and the application of green nanoparticles synthesized from plant extracts to treat pyrexia.

**Choi SJ, Kunwor SK, Im HB, Hwang JH, Choi D, Han D. Traditional and complementary medicine use among cancer patients in Nepal: A cross-sectional survey. BMC Complement Med Ther. 2022 Mar 15;22(1):70. doi: 10.1186/s12906-022-03555-8. PMID: 35291988**

**Abstract:**

**Background:** Traditional and complementary medicine (T&CM) is commonly used in South Asian countries such as Nepal. There are various causes and contributing factors for patients with cancer to consider using T&CM. However, little is known about the use of T&CM among the cancer population in this region.

**Methods:** The study followed a cross-sectional design using a structured survey questionnaire. Survey participants were recruited from two National hospitals in Kathmandu, Nepal. The survey instrument comprised 30 questions, including variables on demographics, use of T&CM, and perceived level of disease severity, and cancer treatment. Chi-square test and logistic regression were used for data analysis using SPSS ver. 23.0.

**Results:** Of 908 participants, 31.6% used one or more modalities of T&CM after a cancer diagnosis. The most commonly used T&CM was Ayurveda (46.5%), followed by yoga (32.4%). About 46% of T&CM users discussed their use with their doctors. The main source of information on T&CM was their family members and relatives (55.7%). Cancer type (head and neck cancer OR: 2.30, CI: 1.23-4.29; abdominal cancer OR: 2.69, CI: 1.47-4.95; lung cancer OR: 5.88, CI: 2.69-12.89), cancer stage (Stage I OR: 1.92, CI: 1.14-3.25; Stage II OR: 1.76, CI: 1.06-2.94), and the patients' self-rated disease severity (high perceived severity OR: 1.50, CI: 1.05-2.16) were strong predictors of T&CM use.

**Conclusion:** This study underlined that despite the widespread use of T&CM among cancer patients in Nepal, most patients obtained information on T&CM from informal sources and did not disclose their use to physicians. To ensure the safe use of T&CM modalities, physicians should integrate questions on T&CM use into routine patient assessments in order to facilitate active communication and improve the quality of care.

**Ferson MJ, Flanigan S, Cains T. Lead poisoning outbreak from consumption of contaminated Ayurvedic medication. Med J Aust. 2022 Mar 7;216(4):212-213. doi: 10.5694/mja2.51422. Epub 2022 Feb 15. PMID: 35170062**

**Ghezelbash B, Shahrokhi N, Khaksari M, Asadikaram G, Shahrokhi M, Shirazpour S. Protective Roles of Shilajit in Modulating Resistin, Adiponectin, and Cytokines in Rats with Non-alcoholic Fatty Liver Disease. Chin J Integr Med. 2022 Mar 8. doi: 10.1007/s11655-022-3307-3. Online ahead of print. PMID: 35258780**

**Abstract:**

**Objective:** To evaluate the effect of Shilajit, a medicine of Ayurveda, on the serum changes in cytokines and adipokines caused by non-alcoholic fatty liver disease (NAFLD).

**Methods:** After establishing fatty liver models by feeding a high-fat diet (HFD) for 12 weeks, 35 Wistar male rats were randomly divided into 5 groups, including control (standard diet), Veh (HFD + vehicle), high-dose Shilajit [H-Sh, HFD + 250 mg/(kg·d) Shilajit], low-dose Shilajit [L-Sh, HFD + 150 mg/(kg·d) Shilajit], and pioglitazone [HFD + 10 mg/(kg·d) pioglitazone] groups, 7 rats in each group. After 2-week of gavage administration, serum levels of glucose, insulin, interleukin 1beta (IL-1 $\beta$ ), IL-6, IL-10, tumor necrosis factor-alpha (TNF- $\alpha$ ), adiponectin, and resistin were measured, and insulin resistance index (HOMA-IR) was calculated.

**Results:** After NAFLD induction, the serum level of IL-10 significantly increased and serum IL-1 $\beta$ , TNF- $\alpha$  levels significantly decreased by injection of both doses of Shilajit and pioglitazone ( $P < 0.05$ ). Increases in serum glucose level and homeostasis model of HOMA-IR were reduced by L-Sh and H-Sh treatment in NAFLD rats ( $P < 0.05$ ). Both doses of Shilajit increased adiponectin and decreased serum resistin levels ( $P < 0.05$ ).

**Conclusion:** The probable protective role of Shilajit in NAFLD model rats may be via modulating the serum levels of IL-1 $\beta$ , TNF- $\alpha$ , IL-10, adipokine and resistin, and reducing of HOMA-IR.

**Ha JW, Yu JS, Lee BS, Kang DM, Ahn MJ, Kim JK et al. Structural Characterization of Withanolide Glycosides from the Roots of *Withania somnifera* and Their Potential Biological Activities. Plants (Basel). 2022 Mar 13;11(6):767. doi: 10.3390/plants11060767. PMID: 35336649**

## **Abstract:**

*Withania somnifera* (Solanaceae), commonly known as "ashwagandha", is an ayurvedic medicinal plant that has been used for promoting good health and longevity. As part of our ongoing natural product research for the discovery of bioactive phytochemicals with novel structures, we conducted a phytochemical analysis of *W. somnifera* root, commonly used as an herbal medicine part. The phytochemical investigation aided by liquid chromatography-mass spectrometry (LC/MS)-based analysis led to the isolation of four withanolide glycosides (1-4), including one new compound, withanoside XII (1), from the methanol (MeOH) extract of *W. somnifera* root. The structure of the new compound was determined by nuclear magnetic resonance (NMR) spectroscopic data, high-resolution (HR) electrospray ionization (ESI) mass spectrometry (MS), and electronic circular dichroism (ECD) data as well as enzymatic hydrolysis followed by LC/MS analysis. In addition, enzymatic hydrolysis of 1 afforded an aglycone (1a) of 1, which was identified as a new compound, withanoside XIIa (1a), by the interpretation of NMR spectroscopic data, HR-ESIMS, and ECD data. To the best of our knowledge, the structure of compound 2 (withagenin A diglucoside) was previously proposed by HRMS and MS/MS spectral data, without NMR experiment, and the physical and spectroscopic data of withagenin A diglucoside (2) are reported in this study for the first time. All the isolated compounds were evaluated for their anti-*Helicobacter pylori*, anti-oxidant, and anti-inflammatory activities. In the anti-*Helicobacter pylori* activity assay, compound 2 showed weak anti-*H. pylori* activity with 7.8% inhibition. All the isolated compounds showed significant ABTS radical scavenging activity. However, all isolates failed to show inhibitory activity against nitric oxide (NO) production in lipopolysaccharide-stimulated RAW 264.7 macrophage cells. This study demonstrated the experimental support that the *W. somnifera* root is rich in withanolides, and it can be a valuable natural resource for bioactive withanolides.

**Horiuchi T, Narimatsu K, Hokari R. Imported Ayurvedic Medicine and Lead Poisoning. Intern Med. 2022 Mar 26. doi: 10.2169/internalmedicine.9178-21. Online ahead of print. PMID: 35342137**

**Irudayaraj SS, Jincy J, Sunil C, Duraipandiyan V, Ignacimuthu S, Chandramohan G et al. Antidiabetic with antilipidemic and antioxidant effects of flindersine by enhanced glucose uptake through GLUT4 translocation and PPAR $\gamma$  agonism in type 2 diabetic rats. J Ethnopharmacol. 2022 Mar 1;285:114883. doi: 10.1016/j.jep.2021.114883. Epub 2021 Nov 30. PMID: 34861363**

## **Abstract:**

**Ethnopharmacological relevance:** Medicinal plants have been used by the people of developing countries to treat various diseases. WHO also recommends the use of medicines from plants source. In that, diabetes also

one of the diseases that have been treated traditionally by several people all over the world. In India, *Toddalia asiatica* (L.) Lam. (Rutaceae) is also a medicinal plant used traditionally for the treatment of diabetes in Ayurveda. Moreover, *T. asiatica* is also used in a polyherbal formulation to treat diabetes.

**Aim of the study:** This study examined the antidiabetic with antilipidemic and antioxidant effects of flindersine isolated from *T. asiatica* leaves.

**Materials and methods:** Diabetes was induced in Wistar rats by feeding a high-fat diet (HFD) for 15 days and injecting a single dose of 40 mg/kg b. wt. of Streptozotocin (STZ). Five days post-injection, the grouped diabetic rats were treated with 20 and 40 mg/kg of flindersine.

**Results:** Flindersine resulted in a clear decline of blood glucose levels during 28 days of treatment in two different doses. Flindersine also significantly ( $P \leq 0.05$ ;  $P \leq 0.005$ ) reduced the body weight gain, plasma insulin concentration, urea, creatinine, total cholesterol (TC), triglycerides (TG) and free fatty acids (FFA) levels and significantly increased ( $P \leq 0.05$ ;  $P \leq 0.005$ ) the total protein level, superoxide dismutase (SOD), catalase (CAT) and glutathione peroxidase (GPx) activities compared to the standard drug, pioglitazone. Additionally, flindersine restored the glucose transporter protein 4 (GLUT4), adenosine monophosphate protein kinase (AMPK) and peroxisome proliferator-activated receptor  $\gamma$  (PPAR $\gamma$ ) expressions in adipose tissues and skeletal muscles.

**Conclusion:** It has been found that flindersine has potent antilipidemic and antidiabetic activities by improving insulin sensitivity by enhancing the phosphorylation of AMPK, GLUT4 translocation, and PPAR $\gamma$  agonism on adipose tissue and skeletal muscles of diabetic rats.

**Jain V, Roy K. Severe Lead Toxicity Due to Ayurvedic Medicine in a Child with Type 1 Diabetes Mellitus: Authors' Reply. Indian J Pediatr. 2022 Mar 17. doi: 10.1007/s12098-022-04106-2. Online ahead of print. PMID: 35298771**

**Karthikkeyan G, Behera SK, Upadhyay SS, Pervaje R, Prasad TSK, Modi PK. Metabolomics analysis highlights Yashtimadhu (*Glycyrrhiza glabra* L.)-mediated neuroprotection in a rotenone-induced cellular model of Parkinson's disease by restoring the mTORC1-AMPK1 axis in autophagic regulation. Phytother Res. 2022 Mar 20. doi: 10.1002/ptr.7449. Online ahead of print. PMID: 35307886**

**Khot SG, Tubaki BR, Gonugade VB. Efficacy of Brahmi vati in generalised anxiety disorder: Randomized double blind comparative clinical trial. J Ayurveda Integr Med. 2022 Mar 21;13(2):100552. doi: 10.1016/j.jaim.2022.100552. Online ahead of print. PMID: 35325682**

**Abstract:**



**Background:** Generalized Anxiety Disorder (GAD) is the most common anxiety disorder. GAD has high comorbidities and it can affect social, professional and personal life. Ayurvedic medicine, Brahmi vati is explored for the possible role in management of GAD and is compared to Manasmitra vataka.

**Aim:** To evaluate the efficacy of B. vati on Generalized Anxiety Disorder.

**Methods:** A randomized double blind controlled trial, with total 56 patients meeting the DSM V criteria of GAD between 20-60 years of age and either sex participated in the study. Participants were randomly divided into two groups, Brahmi group received capsule B. vati 500 mg and Manasmitra group received capsule M. vataka 500 mg thrice a day with water for 45 days. Assessments were conducted through various clinical parameters such as Hamilton Anxiety Rating Scale (HARS), GAD 7 scale (GAD 7), Beck Depression Inventory scale (BDI), Epworth sleepiness scale (ESS), Pittsburgh Sleep Quality Index (PSQI), WHO Quality of Life- BREF (WHOQOL-BREF), Clinical Global Improvement scale (CGI). Blood variables including Haemoglobin, Erythrocyte Sedimentation Rate (ESR), Liver Function Test (LFT) and serum creatinine were assessed before and after the study. Assessments during intervention were conducted on every 15th day.

**Results:** Study results indicate that both B. vati and M. vataka were comparable and each produced significant improvement ( $p < 0.001$ ) in HARS, GAD-7, BDI, ESS, PSQI, WHOQOL-BREF and CGI. Brahmi vati also produced significant decrease in systolic ( $p = 0.002$ ) and diastolic ( $p < 0.001$ ) blood pressure. Both groups showed good safety profile evaluated through the assessment of serum creatinine levels and LFT.

**Conclusion:** B. vati and M. vataka were effective, safe and comparable in the management of GAD. Warrants further studies.

**Laldingliani TBC, Thangjam NM, Zomuanawma R, Bawitlung L, Pal A, Kumar A. Ethnomedicinal study of medicinal plants used by Mizo tribes in Champhai district of Mizoram, India. J Ethnobiol Ethnomed. 2022 Mar 24;18(1):22. doi: 10.1186/s13002-022-00520-0. PMID: 35331291**

**Abstract:**

**Background:** Medicinal plants have been used countless times for curing diseases mainly in developing countries. They are easily available with little to no side effects when compared to modern medicine. This manuscript encompasses information on ethnomedicinal plants in Champhai district, located in the North East Region (NER) of India. The region lies within Indo-Burma biodiversity hotspot. This study will be the first quantitative report on the ethnomedicinal plants used by the local tribes of this region. Knowledge of medicinal plants is mostly acquired by word of mouth, and the knowledge is dying among the local youths with the prevalence of modern medicine. Hence, there is urgency in deciphering and recording such information.

**Methods:** Information was gathered through interviews with 200 informants across 15 villages of the Champhai district. From the data obtained, we evaluate indices such as used report (UR), frequency of citation (FC), informant consensus factor (Fic), cultural values (CVs) and relative importance (RI) for all the plant species. Secondary data were obtained from scientific databases such as Pubmed, Sci Finder and Science Direct. The scientific name of the plants was matched and arranged in consultation with the working list of all plant species ( <http://www.theplantlist.org> ).

**Results:** Totally, 93 plant species from 53 families and 85 genera were recorded. The most common families are Euphorbiaceae and Asteraceae with six and five species representatives, respectively. Leaves were the most frequently used part of a plant and were usually used in the form of decoction. *Curcuma longa* has the most cultural value (27.28 CVs) with the highest used report (136 FC), and the highest RI value was *Phyllanthus emblica*. The main illness categories as per Frequency of citation were muscle/bone problem (0.962 Fic), gastro-intestinal disease (0.956 Fic) and skin care (0.953 Fic).

**Conclusion:** The people of Mizoram living in the Champhai district have an immense knowledge of ethnomedicinal plants. There were no side effects recorded for consuming ethnomedicinal plants. We observed that there is a scope of scientific validation of 10 plant species for their pharmacological activity and 13 species for the phytochemical characterisation or isolation of the phytochemicals. This might pave the path for developing a scientifically validated botanical or lead to semisynthetic derivatives intended for modern medicine.

**Mahesh S, Shivaprasad KS, Sanjana M. Ayurvedic hospital wastewater degradation using electrochemical treatment. Water Sci Technol. 2022 Mar;85(6):1855-1877. doi: 10.2166/wst.2022.079. PMID: 35358076**

**Abstract:**

The goal of this research was to remove COD, oil and grease (O&G) and color from raw ayurvedic hospital wastewater (AHWW) using a novel electrochemical coagulation (ECC) process. Cell voltage was initially optimized using iron electrodes in bipolar mode for both raw AHWW and ayurvedic hospital therapy room wastewater (AH-TRWW) for a pre-optimized electrolysis time (ET) of 60 min. O&G, COD and color removals for AHWW at 8 V optimized cell voltage were 96, 61 and 96% respectively. Different electrode materials, copper, aluminum, graphite, were used to evaluate relative performances at 8 V. Iron electrodes showed maximum pollutant removal from raw AHWW. The sludge obtained after the ECC process showed good settling and filterability properties compared to graphite and aluminum electrodes. The low SVI value of 146 mL/g was obtained exercising absolute control on sludge volume. Solids flux values showed assurances of compact settling tank design with least spatial footprint. EDX analysis for ECC sludge of AHWW using iron showed gross elements 40.19% C, 48.63% O and 7.92% Fe redefining the fate of sludge. The XRD pattern of the ECC sludge showed an amorphous nature. Post-ECC filtration

effluent showed clear water reclamation of 80-82%, proving the effectiveness of the novel ECC treatment process.

**Maideen NMP, Balasubramaniam R, Manavalan G, Balasubramanian K, Nivedhitha S, Thirumal M et al. Insight of Clinical Evidences of Ayurveda Interventions in the Management of COVID-19 Patients. Infect Disord Drug Targets. 2022 Mar 21. doi: 10.2174/1871526522666220321152504. Online ahead of print. PMID: 35319399**

**Abstract:**

**Background:** Severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) caused Coronavirus disease 2019 (COVID-19) and the patients with COVID-19 might be managed with traditional medicine like Ayurveda alone or in combination with standard allopathic treatment as Ayurveda is one of the oldest traditional medicinal systems followed by millions around the globe.

**Methods:** The literature was searched in databases such as LitCOVID, Google Scholar, Science Direct, EBSCO, Scopus, Web of science, EMBASE, and reference lists to identify articles relevant to the use of Ayurvedic medicines in the management of COVID-19.

**Results:** Several clinical studies have determined the efficacy of Ayurvedic medicines and formulations in the management of patients with COVID-19.

**Conclusion:** The Ayurvedic medicines and formulations having antiviral, antioxidant, anti-inflammatory, and immunomodulatory properties could be used along with standard allopathic medicines to assist in the earlier clearance of virus, speedy recovery of patients with COVID-19, faster discharge from hospitals, and the prevention of further deterioration.

**Mathur P, Leburu S, Kulothungan V. Prevalence, Awareness, Treatment and Control of Diabetes in India From the Countrywide National NCD Monitoring Survey. Front Public Health. 2022 Mar 14;10:748157. doi: 10.3389/fpubh.2022.748157. eCollection 2022. PMID: 35359772**

**Abstract:**

**Background:** To determine the prevalence, awareness, treatment and control of diabetes mellitus (DM) and associated factors amongst adults (18-69 years) in India from the National Noncommunicable Disease Monitoring Survey (NNMS).

**Methods:** NNMS was a comprehensive, cross-sectional survey conducted in 2017-18 on a national sample of 12,000 households in 600 primary sampling units. In every household, one eligible adult aged 18-69 years were selected. Information on NCD risk factors and their health-seeking behaviors were collected. Anthropometric measurements, blood pressure and fasting capillary

blood glucose were measured. DM was defined as fasting blood glucose (FBG)  $\geq 126$  mg/dl including those on medication. Awareness, treatment, and control of DM were defined as adults previously diagnosed with DM by a doctor, on prescribed medication for DM, and FBG  $< 126$  mg/dl, respectively. The weighted data are presented as mean and proportions with 95% CI. We applied the Student t-test for continuous variables, Pearson's chi-square test for categorical variables and multivariate regression to determine the odds ratio. For statistical significance, a p-value  $< 0.05$  was considered.

**Results:** Prevalence of DM and impaired fasting blood glucose (IFG) in India was 9.3% and 24.5% respectively. Among those with DM, 45.8% were aware, 36.1% were on treatment and 15.7% had it under control. More than three-fourths of adults approached the allopathic practitioners for consultation (84.0%) and treatment (78.8%) for diabetes. Older adults were associated with an increased risk for DM [OR 8.89 (95% CI 6.66-11.87)] and were 16 times more aware of DM. Better awareness, treatment and control levels were seen among adults with raised blood pressure and raised cholesterol.

**Conclusions:** The prevalence of DM and IFG is high among adults, while the levels of awareness, treatment and control are still low in India, and this varied notably between the age groups. Multifaceted approaches that include improved awareness, adherence to treatment, better preventive and counseling services are crucial to halt diabetes in India. Also, expanding traditional systems of medicine (Ayurveda, Yoga, Naturopathy, Unani, Siddha, and Homeopathy [AYUSH]) into diabetes prevention and control practices open solutions to manage this crisis.

**MS Poornima, G Sindhu, A Billu, CR Sruthi, P Nisha, P Gogoi et al. Pretreatment of hydroethanolic extract of *Dillenia indica* L. attenuates oleic acid induced NAFLD in HepG2 cells via modulating SIRT-1/p-LKB-1/AMPK, HMGCR & PPAR- $\alpha$  signaling pathways. J Ethnopharmacol. 2022 Mar 26;292:115237. doi: 10.1016/j.jep.2022.115237. Online ahead of print. PMID: 35351574**

**Abstract:**

**Ethnopharmacological relevance:** *Dillenia indica* L. is an edible plant from the Dilleniaceae family present in the forest of India and other Asian countries. Different parts of this plant are being used in the traditional system of medicines for various diseases like diabetes, indigestion, asthma, jaundice, and rheumatic pain by various rural communities. This plant is very common among Khamptis traditional healers, the rural community of the Dhemaji district of Assam, ethnic communities of Dibru-Saikhowa Biosphere Reserve of Northeast, India for various medicinal uses. It is observed as a 'vat' suppressant and 'pitta' boosting medicine in Ayurveda.

**Aim of the study:** The aim of this research was to evaluate the effect of hydroethanolic extract of *Dillenia indica* leaf (DI-HET) against non-alcoholic fatty liver disease (NAFLD) as it is reported effective against jaundice in

traditional medicine. We are also planning to see the various molecular mechanisms responsible for its effect if it is efficacious.

**Study design/method:** An in vitro model for NAFLD was employed in this study. For this HepG2 cells were incubated with 100  $\mu$ M of oleic acid (OA) for 24 h. For evaluation of the effect of DI-HET, the extracts (5 or 10  $\mu$ g/mL) were pretreated to the OA group. Fenofibrate was the positive control. Various parameters relevant to lipogenesis and  $\beta$ -oxidation of fatty acids like intracellular lipid accumulation, reactive oxygen species (ROS), mitochondrial stress, and key proteins were studied.

**Results:** DI-HET significantly reduced the intracellular lipid accumulation in OA treated cells. And also substantially decreased the expression of lipogenic proteins and increased  $\beta$ -oxidation in the OA group. OA induced ROS generation was found to reduce with DI-HET treatment. Western blot analysis showed that the expression of LXR- $\alpha$ , SREBP-1C, SREBP-2, HMGCR, FAS, CD-36, and ACOX-1 were downregulated while that of SIRT-1, p-LKB-, p-AMPK, p-ACC, CPT-1, and PPAR- $\alpha$  upregulated in DI-HET treatment. LCMS/MS analysis showed the presence of polyphenols like naringenin, catechin, epicatechin, shikimic acid, syringic acid, vanillic acid, and kaempferol.

**Conclusion:** These results suggest that DI-HET is effective against NAFLD by activation of the SIRT-1/p-LKB-1/AMPK signaling pathway via polyphenols present in the extract.

**Murthy HN. Biotechnological production of bacosides from cell and organ cultures of *Bacopa monnieri*. Appl Microbiol Biotechnol. 2022 Mar;106(5-6):1799-1811. doi: 10.1007/s00253-022-11834-0. Epub 2022 Feb 24. PMID: 35201388**

**Abstract:**

*Bacopa monnieri* (L.) Wettst. (BM), also known as 'Brahmi' or 'Water Hyssop', has been utilized as a brain tonic, memory enhancer, sensory organ revitalizer, cardiogenic, anti-anxiety, antidepressant and anticonvulsant agent in the Indian system of medicine Ayurveda for centuries. BM is beneficial in the treatment of Parkinson's disease, Alzheimer's disease, epileptic seizures and schizophrenia in recent pharmacological research. Dammarane-type triterpenoid saponins containing jujubogenin and pseudojujubogenin as aglycones, also known as bacosides, are the principal chemical ingredients identified and described from BM. Bacosides have been shown to have anti-ageing, anticancer, anticonvulsant, antidepressant, anti-emetic, anti-inflammatory and antibacterial properties in a variety of pre-clinical and clinical studies. The pharmaceutical industry's raw material comes from wild sources; nevertheless, the concentration of bacosides varies in different regions of the plants, as well as seasonal and genotypic variation. Cell and tissue cultures are appealing alternatives for the long-term manufacture of bioactive chemicals, and attempts to produce bacosides using in vitro cultures have been made. This review discusses the biotechnological approaches used to

produce bacosides, as well as the limitations and future potential. KEY POINTS: • Bacosides extracted from *Bacopa monnieri* are important pharmaceutical compounds. • The current review provides insight into biotechnological interventions for the production of bacosides using in vitro cultures. • Highlights the prospects improvement of bacoside production through metabolic engineering.

**Nadh AG, Revikumar A, Sudhakaran PR, Nair AS. Identification of potential lead compounds against BACE1 through in-silico screening of phytochemicals of Medhya rasayana plants for Alzheimer's disease management. Comput Biol Med. 2022 Mar 24;145:105422. doi: 10.1016/j.compbimed.2022.105422. Online ahead of print. PMID: 35354103**

**Abstract:**

Alzheimer's disease is a progressive and irreversible neurodegenerative disease that accounts for 70-80% of dementia in the elderly. According to recent clinical data, the incidence of the disease is exponentially increasing with age. Beta-site amyloid precursor protein cleaving enzyme 1 (BACE1) is an important molecule involved in the pathogenesis of Alzheimer's disease due to its early role in the amyloid cascade. Cleavage of amyloid precursor protein by BACE1 is the rate-limiting step leading to the production and aggregation of amyloid-beta plaques. A number of natural products are being identified as non-competitive BACE1 inhibitors. In Ayurveda, Medhya rasayana is a group of medicinal herbs, specifically used for managing neurological disorders and is known to be effective in improving cognition and intellect. This study aimed to analyze the pharmacological activity of bio-active compounds in Medhya rasayana plants against BACE1, employing structure-based docking approach. 11 compounds out of 876 were identified as potential hits, based on docking scores, binding energies, and interactions with the critical residues of BACE1. Possible neurological activities of these compounds were predicted using PASS server. Out of the 11 compounds screened, two compounds, 'Convolidine' from the plant *Convolvulus pleuricaulis* Choisy and 'N-(4-hydroxybutyl) phthalimide' from *Glycyrrhiza glabra* satisfied the pharmacological parameters of Lipinski rule of filtering and ADMET prediction. The binding stability of these compounds against BACE1 was confirmed by molecular dynamic simulation and post dynamic MM/GBSA calculations. Detailed analysis of the interaction with the critical amino acids in the active site revealed the possible inhibitory potential of these compounds of medicinal plant origin against BACE1.

**Pett J, Mohamed F, Knight J, Linhart C, Osborne NJ, Taylor R. Two decades of chronic kidney disease of unknown aetiology (CKDu) research: Existing evidence and persistent gaps from epidemiological studies in Sri Lanka. Nephrology (Carlton). 2022 Mar;27(3):238-247. doi: 10.1111/nep.13989. Epub 2021 Nov 9. PMID: 34704321**

**Abstract:**

**Background:** Chronic Kidney Disease of unknown origin (CKDu) excludes known primary renal conditions or systemic disease (such as diabetes mellitus or hypertension). Prominence of CKDu has been noted for some decades in Sri Lanka, especially among men in particular rural areas, prompting many studies directed towards environmental causation. This article critically reviews relevant primary studies.

**Methods:** Articles for this literature review (n = 86) were found by searching Medline, Embase, Global Health and ProQuest databases over 2000-2020 utilizing a standard algorithm. Articles were critiqued according to criteria for diagnosis of CKDu, aetiological agents investigated, analytic methods employed and findings.

**Results:** Criteria for diagnosis of CKDu varied significantly, including pre-selection by proteinuria, eGFR and biopsy proven interstitial nephritis. Prevalence studies have been largely conducted in the North Central Province, with recent studies demonstrating the presence of CKDu in other regions. Aetiological factors investigated in primary studies included water source, use of agrochemicals, agricultural work, heavy metals, snake bites, ayurvedic medication, heat stress, infectious diseases and usage of tobacco and betel leaf. There is no conclusive evidence for any one aetiological agent despite consistent evidence of distal factors such as male sex, rural residence and farming.

**Conclusions:** The current body of evidence for any aetiological agent as the cause of CKDu in Sri Lanka is limited. Further research with stronger study designs is necessary to increase knowledge of aetiology of CKDu in Sri Lanka to identify and eliminate exposure to possible causative agent(s) prior to concluding that the disease is multifactorial.

**Prakash T, Janadri S. Anti-inflammatory effect of wedelolactone on DSS induced colitis in rats: IL-6/STAT3 signaling pathway. J Ayurveda Integr Med. 2022 Mar 22:100544. doi: 10.1016/j.jaim.2022.100544. Online ahead of print. PMID: 35337710**

**Abstract:**

**Background:** Wedelolactone, main active constituent of *Wedelia calendulace* and *Eclipta alba* plants which has been traditionally used to treat various chronic inflammatory conditions. However, its mechanism of action of anti-inflammatory effect on ulcerative colitis is yet to be established.

**Objective:** In the present study, the effect of the wedelolactone on the myeloperoxidase activities and in the production of proinflammatory cytokines involved in the pathogenesis of chronic inflammation was assessed.

**Materials and methods:** Wistar rats were randomly divided into four groups containing six animals per group. Group I (Vehicle control): tap water and

vehicle; Group II (DSS control): tap water containing 5% (w/v) of DSS over 7 days, and vehicle; Group III (treatment group): Wedelolactone 50 mg/kg/day, and tap water containing 5% DSS over 7 days, Group IV (treatment group): Wedelolactone 100 mg/kg/day and tap water containing 5% DSS over 7 days over the experiment.

**Results:** Study revealed that wedelolactone treatment dramatically decrease the release of IL-1a, IL-1b, IL-2, TNF, INF $\gamma$ , STAT3 and CCL-5 in colons treated with DSS. In summary, these results suggest that the inhibition of IL-6/STAT3 signaling is a potential mechanism by which wedelolactone is used in the treatment of ulcerative colitis.

**Conclusion:** Oral administration of Wedelolactone (100 mg/kg) significantly attenuated pathological colonic damage and inhibited inflammatory infiltration, myeloperoxidase activities. In summary, Wedelolactone showed anti-inflammatory effect by down regulation of the IL-6/STAT3 inflammatory signaling pathway. These findings provide new insights into the pharmacological actions of wedelolactone as a potential therapeutic agent for colitis.

**S KR, Panda AK, P B, Kar BR, S I. Ayurveda panchakarma treatment success in a case of chronic spontaneous urticaria non-responding to conventional medicine-A case study. J Ayurveda Integr Med. 2022 Mar 4;13(2):100549. doi: 10.1016/j.jaim.2022.100549. Online ahead of print. PMID: 35255270**

**Abstract:**

This is a case study of a 34-year-old male patient of Chronic Spontaneous Urticaria (CSU) with severe generalised itching and rashes all over the body since 17 years. The patient has no significant relief with conventional antihistamine therapies, AST (Autologous serum therapy) and Omalizumab (OMA). He was clinically assessed and managed with Ayurvedic Panchakarma procedures like Snehapana(therapeutic administration of unctuous formulation like ghee, oil), Vamana, Virechana and internal medication in line of Seethapitta Chikitsa. The patient was asked to monitor hives and itching daily for one week using a validated weekly Urticaria Activity Score (UAS7) at the baseline, after Vamana, after Virechana and after follow up. The Quality of life was assessed at the baseline and after follow-up using Chronic Urticaria Quality of Life Questionnaire (CU-Q2oL). The assessment showed complete remission in disease activity and improvement in Quality of life as per the scores. The hematological and biochemical investigations reflect the safety and efficacy of Ayurveda in management of CSU.

**Sanyal R, Nandi S, Pandey S, Chatterjee U, Mishra T, Datta S, Prasanth DA et al. Biotechnology for propagation and secondary metabolite production in Bacopa monnieri. Appl Microbiol Biotechnol. 2022 Mar;106(5-6):1837-1854. doi: 10.1007/s00253-022-11820-6. Epub 2022 Feb 26. PMID: 35218388**



## **Abstract:**

*Bacopa monnieri* (L.) Wettst. or water hyssop commonly known as "Brahmi" is a small, creeping, succulent herb from the Plantaginaceae family. It is popularly employed in Ayurvedic medicine as a nerve tonic to improve memory and cognition. Of late, this plant has been reported extensively for its pharmacologically active phyto-constituents. The main phytochemicals are brahmine, alkaloids, herpestine, and saponins. The saponins include bacoside A, bacoside B, and betulic acid. Investigation into the pharmacological effect of this plant has thrived lately, encouraging its neuroprotective and memory supporting capacity among others. Besides, it possesses many other therapeutic activities like antimicrobial, antioxidant, anti-inflammatory, gastroprotective properties, etc. Because of its multipurpose therapeutic potential, it is overexploited owing to the prioritization of natural remedies over conventional ones, which compels us to conserve them. *B. monnieri* is confronting the danger of extinction from its natural habitat as it is a major cultivated medico-botanical and seed propagation is restricted due to less seed availability and viability. The ever-increasing demand for the plant can be dealt with mass propagation through plant tissue culture strategy. Micropropagation utilizing axillary meristems as well as de novo organogenesis have been widely investigated in this plant which has also been explored for its conservation and production of different types of secondary metabolites. Diverse in vitro methods such as organogenesis, cell suspension, and callus cultures have been accounted for with the aim of production and/or enhancement of bacosides. Direct shoot-organogenesis was initiated in excised leaf and internodal explants without any exogenous plant growth regulator(s) (PGRs), and the induction rate was improved when exogenous cytokinins and other supplements were used. Moreover, biotechnological toolkits like *Agrobacterium*-mediated transformation and the use of mutagens have been reported. Besides, the molecular marker-based studies demonstrated the clonal fidelity among the natural and in vitro generated plantlets also elucidating the inherent diversity among the natural populations. *Agrobacterium*-mediated transformation system was mostly employed to optimize bacoside biosynthesis and heterologous expression of other genes. The present review aims at depicting the recent research outcomes of in vitro studies performed on *B. monnieri* which include root and shoot organogenesis, callus induction, somatic embryogenesis, production of secondary metabolites by in vitro propagation, acclimatization of the in vitro raised plantlets, genetic transformation, and molecular marker-based studies of clonal fidelity. KEY POINTS: • Critical and up to date records on in vitro propagation of *Bacopa monnieri* • In vitro propagation and elicitation of secondary metabolites from *B. monnieri* • Molecular markers and transgenic studies in *B. monnieri*.

**Sarkar PK, Das Mukhopadhyay C. Mechanistic insights from the review and evaluation of ayurvedic herbal medicines for the prevention and management of COVID-19 patients. J Herb Med. 2022 Mar;32:100554. doi: 10.1016/j.hermed.2022.100554. Epub 2022 Feb 18. PMID: 35251909**

**Abstract:**

**Introduction:** The need for specific therapeutics against infectious diseases is made very important at this moment by the COVID-19 pandemic caused by SARS-COV-2. Vaccines containing live attenuated or heat-inactivated pathogens elicit robust immune responses, but their safety is sometimes not assured. Subunit vaccines consisting of the most potent antigenic protein or carbohydrates of the pathogen are safer but often induce a weak immune response. Traditional Ayurveda medicines have a long history of safety and may act as immuno-modulators or vaccine adjuvants. They can reduce the amount of vaccine booster doses required to elicit an immune response against any pathogen. The main objective of this review is a mechanistic evaluation of the antiviral potential of Ayurveda herbal compositions for their ability to increase cytokine expression and enhance NK cell activity, activate CD4/ CD8 + T cells, and increase the formation of IL-2 and IFN $\gamma$  against SARS-CoV-2 infection.

**Methods:** Various peer-reviewed publications, books, monographs, and reputed search engines were reviewed in depth. Information available from the Ayurvedic Pharmacopoeia and in recent in silico analyses were compared in order to understand the mechanism of action of herbal components against SARS-CoV-2.

**Results:** It was found in various molecular docking and molecular dynamics studies that many bioactive natural components of Ayurvedic medicines could prevent viral entry or multiplication within a human host.

**Conclusion:** Ayurvedic herbal medicines can be used either independently as therapeutics or as a complement to the modern-day recombinant vaccines with immediate effect. Ayurveda-based adjuvant therapy can also efficiently manage the secondary symptoms of COVID 19 patients.

**Scherbaum CR, Frank T, Suarez V. Severe lead poisoning caused by ayurvedic medicine. Dtsch Med Wochenschr. 2022 Mar;147(5):253-257. doi: 10.1055/a-1743-6718. Epub 2022 Feb 28. PMID: 35226924**

**Abstract:**

**History:** We report the case of a young patient who presented to our emergency department with reduced general condition, anemia, and crampy abdominal pain. A previous inpatient workup including abdominal imaging and bone marrow aspiration had not yielded a diagnosis. On inquiry, the patient reported oral ingestion of an Ayurvedic remedy over the course of one month.

**Findings:** 24-year-old circulatory stable patient in reduced general condition with gray skin coloration and a dark gingival margin. Laboratory testing revealed an increase in transaminases and normocytic anemia. A peripheral blood smear showed basophilic stippling of the erythrocytes. Significantly

elevated lead levels were detected in the patient's blood and hair. Toxic lead levels were detected in the ingested preparation.

**Diagnosis:** Severe lead poisoning caused by self-medication with an Ayurvedic remedy. Analysis revealed a daily oral lead load of 136 times the maximum permissible dose.

**Therapy and course:** By means of chelation therapy, the blood lead levels were significantly reduced, and there was a complete regression of the complaints as well as a normalization of the laboratory findings.

**Conclusion:** Lead has toxic effects on all organ systems of the body and is stored in the bone for decades. Symptoms of poisoning are nonspecific; a thorough history and generous indication for measuring lead levels are helpful for the diagnosis.

**Singh S, Agrawal NK, Singh G, Gehlot S, Singh SK, Singh R. Clinical Prediction of Type 2 Diabetes Mellitus (T2DM) via Anthropometric and Biochemical Variations in Prakriti. Diseases. 2022 Mar 3;10(1):15. doi: 10.3390/diseases10010015. PMID: 35323182**

**Abstract:**

Type 2 Diabetes Mellitus (T2DM) is a complicated multifactorial illness involving hereditary and external environmental variables. The symptoms typically appear gradually over a number of years without realizing it. This viewpoint is further supported by the Ayurvedic constitution concept (*Prakriti*). *Prakriti* explains the biological variability that is observed in different individuals. This study was conducted a retrospective investigation to examine if there was a link between type 2 diabetes and an individual's constitution based on anthropometric and biochemical characteristics. Physical and mental characteristics and anthropometric and biochemical markers were used to determine reported cases' prevailing *Dosha Prakriti* (constitution). Based on biochemical and anthropometric data, significant differences in *Prakriti* were found between the case (T2DM patients) and control (person without diabetes) groups. The incidence of numerous secondary problems linked with T2DM patients was also evaluated according to their *Prakriti* types, which revealed a positive relationship. The three primary contributing parameters, such as waist-hip ratio, postprandial blood sugar, and serum creatinine, were correctly classified all person with or without diabetes subjects to 90.6% of the time, whereas the constitution-wise study classified person with diabetes and without diabetes individuals of *Pitta* and *Kapha Prakriti* to 94.3% and 90%, respectively. A discriminant function was created to predict a person with diabetes and without diabetes based on these three contributing factors. The primary contributing biochemical parameters discovered by *Prakriti* in the current study could be used as a biochemical disease diagnostic for predicting type 2 diabetes susceptibility.

**Soni G Neelam. Introduction of transitional curriculum (TC) for the first-year undergraduate in Ayurveda, a welcome move by the Ministry of Ayush. J Ayurveda Integr Med. 2022 Mar 4;13(2):100551. doi: 10.1016/j.jaim.2022.100551. Online ahead of print. PMID: 35255269**

**Vijeata A, Chaudhary S, Chaudhary GR. Fluorescent carbon dots from Indian Bael patra as effective sensing tool to detect perilous food colorant. Food Chem. 2022 Mar 30;373(Pt B):131492. doi: 10.1016/j.foodchem.2021.131492. Epub 2021 Oct 28. PMID: 34743055**

**Abstract:**

Herein a simple strategy has been demonstrated for the synthesis of environmentally amiable and highly fluorescent carbon dots from the most useful plant of Indian classical Ayurveda i.e. Bael patra fruit. The morphological features and chemical composition of the prepared carbon dots were characterized through High resolution transmission electron microscopy, Field emission scanning electron microscopy and X-ray photoelectron spectroscopy. Owing to their highly emission nature, the applicability of carbon dots was tested against various food colorant i.e. Allura red. Under the optimized conditions, the decreased fluorescence intensity exhibited a good linear relationship with increasing concentration of Allura red. Additionally, an extensive research was carried out to determine the adsorption efficiency of carbon dots for Allura red and heavy metals. Based on the context, here we report the novelty of this work, demonstrating the decontamination of various samples from Allura red and heavy metals with the application of carbon dots.

**Vinothkanna A, Sathiyarayanan G, Rai AK, Mathivanan K, Saravanan K, Sudharsan K et al. Exopolysaccharide Produced by Probiotic *Bacillus albus* DM-15 Isolated From Ayurvedic Fermented *Dasamoolarishta*: Characterization, Antioxidant, and Anticancer Activities. Front Microbiol. 2022 Mar 3;13:832109. doi: 10.3389/fmicb.2022.832109. eCollection 2022. PMID: 35308379**

**Abstract:**

An exopolysaccharide (EPS) was purified from the probiotic bacterium *Bacillus albus* DM-15, isolated from the Indian Ayurvedic traditional medicine *Dasamoolarishta*. Gas chromatography-mass spectrophotometry and nuclear magnetic resonance (NMR) analyses revealed the heteropolymeric nature of the purified EPS with monosaccharide units of glucose, galactose, xylose, and rhamnose. Size-exclusion chromatography had shown the molecular weight of the purified EPS as around 240 kDa. X-ray powder diffraction analysis confirmed the non-crystalline amorphous nature of the EPS. Furthermore, the purified EPS showed the maximum flocculation activity (72.80%) with kaolin clay and emulsification activity (67.04%) with xylene. In addition, the EPS exhibits significant antioxidant activities on DPPH (58.17 ± 0.054%), ABTS (70.47 ± 0.854%) and nitric oxide (58.92 ± 0.744%) radicals in a concentration-dependent way. Moreover, the EPS showed promising

cytotoxic activity ( $20 \pm 0.97 \mu\text{g mL}^{-1}$ ) against the lung carcinoma cells (A549), and subsequent cellular staining revealed apoptotic necrotic characters in damaged A549 cells. The EPS purified from the probiotic strain *B. albus* DM-15 can be further studied and exploited as a potential carbohydrate polymer in food, cosmetic, pharmaceutical, and biomedical applications.

## UNANI MEDICINE

**Fazil M, Nikhat S. Why the "sugars" in traditional Unani formulations are a pivotal component: A viewpoint perspective. J Integr Med. 2022 Mar;20(2):91-95. doi: 10.1016/j.joim.2022.01.002. Epub 2022 Jan 13. PMID: 35078747**

### **Abstract:**

Traditional medicine systems around the globe, like Unani, Ayurveda and traditional Chinese medicine, include a number of sugar-based formulations, which contain a large amount of saccharide-containing sweetener, such as honey, sucrose or jaggery. With pervasive lifestyle disorders throughout the world, there have been discussions to consider alternative sweetening agents. Here, from the perspective of Unani medicine, we discuss how the saccharide-based sweeteners may be an essential component of these traditional preparations, like electuaries, which may be deprived of their bioactivities without these saccharides. With contemporary researches, it is known that apart from their own therapeutic effects, saccharides also form deep eutectic solvents which help in enhancing the bioactivity of other ingredients present in crude drugs. In addition, they provide energy for fermentation which is essential for biotransformation of compounds. Interestingly, the sugars also increase the shelf-life of these compound drugs and act as natural preservatives. On the basis of this review, we strongly believe that saccharide-based sweeteners are an essential component of traditional medicines and not merely an excipient.

**Mathur P, Leburu S, Kulothungan V. Prevalence, Awareness, Treatment and Control of Diabetes in India From the Countrywide National NCD Monitoring Survey. Front Public Health. 2022 Mar 14;10:748157. doi: 10.3389/fpubh.2022.748157. eCollection 2022. PMID: 35359772**

### **Abstract:**

**Background:** To determine the prevalence, awareness, treatment and control of diabetes mellitus (DM) and associated factors amongst adults (18-69 years) in India from the National Noncommunicable Disease Monitoring Survey (NNMS).

**Methods:** NNMS was a comprehensive, cross-sectional survey conducted in 2017-18 on a national sample of 12,000 households in 600 primary sampling units. In every household, one eligible adult aged 18-69 years were selected. Information on NCD risk factors and their health-seeking behaviors were collected. Anthropometric measurements, blood pressure and fasting capillary blood glucose were measured. DM was defined as fasting blood glucose (FBG)  $\geq 126$  mg/dl including those on medication. Awareness, treatment, and control of DM were defined as adults previously diagnosed with DM by a doctor, on

prescribed medication for DM, and FBG <126 mg/dl, respectively. The weighted data are presented as mean and proportions with 95% CI. We applied the Student t-test for continuous variables, Pearson's chi-square test for categorical variables and multivariate regression to determine the odds ratio. For statistical significance, a p-value < 0.05 was considered.

**Results:** Prevalence of DM and impaired fasting blood glucose (IFG) in India was 9.3% and 24.5% respectively. Among those with DM, 45.8% were aware, 36.1% were on treatment and 15.7% had it under control. More than three-fourths of adults approached the allopathic practitioners for consultation (84.0%) and treatment (78.8%) for diabetes. Older adults were associated with an increased risk for DM [OR 8.89 (95% CI 6.66-11.87) and were 16 times more aware of DM. Better awareness, treatment and control levels were seen among adults with raised blood pressure and raised cholesterol.

**Conclusions:** The prevalence of DM and IFG is high among adults, while the levels of awareness, treatment and control are still low in India, and this varied notably between the age groups. Multifaceted approaches that include improved awareness, adherence to treatment, better preventive and counseling services are crucial to halt diabetes in India. Also, expanding traditional systems of medicine (Ayurveda, Yoga, Naturopathy, Unani, Siddha, and Homeopathy [AYUSH]) into diabetes prevention and control practices open solutions to manage this crisis.

## SIDDHA

**Jayaraj JM, Jothimani M, Palanisamy CP, Pentikainen OT, Pannipara M, Al-Sehemi AG et al. Computational Study on the Inhibitory Effect of Natural Compounds against the SARS-CoV-2 Proteins. Bioinorg Chem Appl. 2022 Mar 25;2022:8635054. doi: 10.1155/2022/8635054. eCollection 2022. PMID: 35340421**

### **Abstract:**

COVID-19 is more virulent and challenging to human life. In India, the Ministry of AYUSH recommended some strategies through Siddha, homeopathy, and other methods to effectively manage COVID-19 (Guidelines for AYUSH Clinical Studies in COVID-19, 2020). Kabasura Kudineer and homeopathy medicines are in use for the prevention and treatment of COVID-19 infection; however, the mechanism of action is less explored. This study aims to understand the antagonist activity of natural compounds found in Kabasura Kudineer and homeopathy medicines against the SARS-CoV-2 using computational methods. Potential compounds were screened against NSP-12, NSP-13, NSP-14, NSP-15, main protease, and spike proteins. Structure-based virtual screening results shows that, out of 14,682 Kabasura Kudineer compounds, the 250395, 129677029, 44259583, 44259584, and 88583189 compounds and, out of 3,112 homeopathy compounds, the 3802778, 320361, 5315832, 14590080, and 74029795 compounds have good scoring function against the SARS-CoV-2 structural and nonstructural proteins. As a result of docking, homeopathy compounds have a docking score ranging from -5.636 to 13.631 kcal/mol, while Kabasura Kudineer compounds have a docking score varying from -8.290 to -13.759 kcal/mol. It has been found that the selected compounds bind well to the active site of SARS-CoV-2 proteins and form hydrogen bonds. The molecular dynamics simulation study shows that the selected compounds have maintained stable conformation in the simulation period and interact with the target. This study supports the antagonist activity of natural compounds from Kabasura Kudineer and homeopathy against SARS-CoV-2's structural and nonstructural proteins.

**Mathur P, Leburu S, Kulothungan V. Prevalence, Awareness, Treatment and Control of Diabetes in India From the Countrywide National NCD Monitoring Survey. Front Public Health. 2022 Mar 14;10:748157. doi: 10.3389/fpubh.2022.748157. eCollection 2022. PMID: 35359772**

### **Abstract:**

**Background:** To determine the prevalence, awareness, treatment and control of diabetes mellitus (DM) and associated factors amongst adults (18-69 years) in India from the National Noncommunicable Disease Monitoring Survey (NNMS).

**Methods:** NNMS was a comprehensive, cross-sectional survey conducted in 2017-18 on a national sample of 12,000 households in 600 primary sampling



units. In every household, one eligible adult aged 18-69 years were selected. Information on NCD risk factors and their health-seeking behaviors were collected. Anthropometric measurements, blood pressure and fasting capillary blood glucose were measured. DM was defined as fasting blood glucose (FBG)  $\geq 126$  mg/dl including those on medication. Awareness, treatment, and control of DM were defined as adults previously diagnosed with DM by a doctor, on prescribed medication for DM, and FBG  $< 126$  mg/dl, respectively. The weighted data are presented as mean and proportions with 95% CI. We applied the student t-test for continuous variables, Pearson's chi-square test for categorical variables and multivariate regression to determine the odds ratio. For statistical significance, a p-value  $< 0.05$  was considered.

**Results:** Prevalence of DM and impaired fasting blood glucose (IFG) in India was 9.3% and 24.5% respectively. Among those with DM, 45.8% were aware, 36.1% were on treatment and 15.7% had it under control. More than three-fourths of adults approached the allopathic practitioners for consultation (84.0%) and treatment (78.8%) for diabetes. Older adults were associated with an increased risk for DM [OR 8.89 (95% CI 6.66-11.87)] and were 16 times more aware of DM. Better awareness, treatment and control levels were seen among adults with raised blood pressure and raised cholesterol.

**Conclusions:** The prevalence of DM and IFG is high among adults, while the levels of awareness, treatment and control are still low in India, and this varied notably between the age groups. Multifaceted approaches that include improved awareness, adherence to treatment, better preventive and counseling services are crucial to halt diabetes in India. Also, expanding traditional systems of medicine (Ayurveda, Yoga, Naturopathy, Unani, Siddha, and Homeopathy [AYUSH]) into diabetes prevention and control practices open solutions to manage this crisis.

**Pushkala VP, Sulekha SMP, Mathukumar S, Ragavi B, Sowmiya U. Molecular Docking Analysis of Siddha Formulation Parangipattai Chooranam Against Vaginal Candidiasis. Appl Biochem Biotechnol. 2022 Mar;194(3):1039-1050. doi: 10.1007/s12010-022-03813-y. Epub 2022 Jan 8. PMID: 34997904**

**Abstract:**

Vulvovaginal candidiasis called by its name Vellai Noi as per Siddha terminology is considerably the second most common cause of vaginal inflammation in the women of middle-aged group. *Candida albicans* are prioritised top among other pathogens in mediating vaginal inflammation and its related symptoms. *Candida albicans* exerts its virulence by secreting the enzyme known as secreted aspartyl proteinases (SAP) which allows hassle-free adherence and growth of the opportunistic pathogen. Hence, drugs that selectively inhibit this enzyme may act as a novel candidate drug in halting the growth and invasion of *Candida albicans*. Siddha formulations have century's old credit of managing infectious pathogens. The greater ideology of siddha practice is to adequately strengthen the host immunity and resistance towards

infections. In the present investigation, about twelve phytochemicals have been retrieved from the siddha formulation Parangipattai Chooranam and the same were subjected to molecular docking analysis against SAP enzyme target along with standard fluconazole. Results of the present in silico investigation signify that the compounds such as beta-sitosterol, afzelin, apigenin, quercetin and rosmarinic acid ranked first by demonstrating potential binding affinity with active amino acid residues by occupying the respective binding sites (Asp 32, 83 Lys, Asp86, Gly220, Thr221 and Thr222) in comparison with standard drug fluconazole. Similar binding behaviour was exhibited by other compounds like kaempferol, carnosic acid and engeletin (Asp 32, Gly85, Asp86, Asp218, Gly220, Thr221 and Thr222) against the target amino acids. Vicenin exhibited best binding affinity of - 12.07 kcal/mol followed by beta-sitosterol (- 9.29 kcal/mol), engeletin (- 9.04 kcal/mol), afzelin (- 8.07 kcal/mol) and 4-O-caffeoylquinic acid (- 7.85 kcal/mol) in comparison with fluconazole (- 7.32 kcal/mol). From the results of the present study, it was concluded that the phytochemicals present in the siddha formulation Parangipattai Chooranam reveal significant antifungal activity by inhibiting the target enzyme (SAP) and thereby considered an excellent drug of choice for the clinical management of vaginal candidiasis.

## YOGA

**Anand Thoutam V, Srivastava A, Badal T, Kumar Mishra V, Sinha GR, Sakalle A et al. Yoga Pose Estimation and Feedback Generation Using Deep Learning. Comput Intell Neurosci. 2022 Mar 24;2022:4311350. doi: 10.1155/2022/4311350. eCollection 2022. PMID: 35371230**

### **Abstract:**

Yoga is a 5000-year-old practice developed in ancient India by the Indus-Sarasvati civilization. The word yoga means deep association and union of mind with the body. It is used to keep both mind and body in equilibration in all flip-flops of life by means of asana, meditation, and several other techniques. Nowadays, yoga has gained worldwide attention due to increased stress levels in the modern lifestyle, and there are numerous methods or resources for learning yoga. Yoga can be practiced in yoga centers, through personal tutors, and can also be learned on one's own with the help of the Internet, books, recorded clips, etc. In fast-paced lifestyles, many people prefer self-learning because the abovementioned resources might not be available all the time. But in self-learning, one may not find an incorrect pose. Incorrect posture can be harmful to one's health, resulting in acute pain and long-term chronic concerns. In this paper, deep learning-based techniques are developed to detect incorrect yoga posture. With this method, the users can select the desired pose for practice and can upload recorded videos of their yoga practice pose. The user pose is sent to train models that output the abnormal angles detected between the actual pose and the user pose. With these outputs, the system advises the user to improve the pose by specifying where the yoga pose is going wrong. The proposed method was compared to several state-of-the-art methods, and it achieved outstanding accuracy of 0.9958 while requiring less computational complexity.

**Bringmann HC, Michalsen A, Jeitler M, Kessler CS, Brinkhaus B, Brunnhuber S et al. Meditation-based lifestyle modification in mild to moderate depression-A randomized controlled trial. Depress Anxiety. 2022 Mar 21. doi: 10.1002/da.23249. Online ahead of print. PMID: 35312137**

### **Abstract:**

**Objective:** Depression is a global key challenge in mental health care. The implementation of effective, low-risk and cost-effective interventions to reduce its disease burden is a necessity. The aim of this study was to investigate the efficacy of the new Meditation-Based Lifestyle Modification (MBLM) program, a "second-generation" mindfulness-based intervention, in depressive outpatients.

**Methods:** Eighty-one patients with mild to moderate depression were randomized into three groups: intervention group (MBLM), control group (CONTROL), and treatment as usual group (TAU). The primary outcome was

the change of depressive symptoms as administered by the Beck Depression Inventory-II (BDI-II) after 4 and 8 weeks. Secondary outcome variables included the Brief Symptom Checklist-18 and the Perceived Stress Scale-10. A 6-month follow-up was conducted.

**Results:** A greater reduction of depressive symptoms was found in MBLM participants compared to CONTROL ( $p < .001$ ,  $\eta_p^2 = 0.11$ ,  $d = 0.70$ ) and TAU ( $p < .001$ ,  $\eta_p^2 = 0.10$ ,  $d = 0.67$ ) with a 13.15 points reduction of BDI-II score versus 1.71 points (CONTROL) and 3.34 points (TAU) after 8 weeks. Between-group post hoc tests for all secondary outcomes and at follow-up also yielded significant between-group differences with medium to large effect sizes in favor of MBLM.

**Conclusions:** Study results showed beneficial effects of MBLM in depressed outpatients. Further high-quality controlled clinical studies including qualitative research are needed to investigate the specific and unspecific effects of the MBLM program in depression and other medical conditions.

**Cheshire A, Richards R, Cartwright T. Joining a group was inspiring: A qualitative study of service users' experiences of yoga on social prescription. BMC Complement Med Ther. 2022 Mar 14;22(1):67. doi: 10.1186/s12906-022-03514-3. PMID: 35287676**

**Abstract:**

**Background:** Yoga is becoming an increasingly popular holistic approach in the West to manage long-term health conditions. This study presents the evaluation of a pilot yoga intervention, Yoga4Health, that was developed for the NHS to be socially prescribed to patients at risk of developing specific health conditions (risk factors for cardiovascular disease, pre-diabetes, anxiety/depression or experiencing social isolation). The aim of this qualitative study was to explore service users' experiences of Yoga4Health and the acceptability of the programme.

**Methods:** Qualitative data were collected from three sources: 1. Open-ended questions on questionnaires completed by service users at three different time-points (baseline, post intervention and 3 months); 2. Interviews and focus groups with a subset of participants ( $n = 22$ ); 3. interviews with yoga teachers delivering Yoga4Health ( $n = 7$ ). Each data source was analysed thematically, then findings were combined.

**Results:** Of participants completing baseline questionnaires ( $n = 240$ ), 82.5% were female, 50% White, with a mean age of 53 (range 23-82) years. Baseline questionnaires revealed key motivations to attend Yoga4Health were to improve psychological and physical health, and believing Yoga4Health would be accessible for people with their health condition. Post-intervention, participants reported a range of benefits across psychological, physical and social domains from Yoga4Health. Increased confidence in self-management of

health was also reported, and a number of participants described making positive lifestyle changes after attending the programme. Unanticipated benefits of yoga emerged for participants, such as enjoyment and social connectedness, which facilitated ongoing attendance and practice. Also key to facilitating practice (during and after the intervention) were suitability of the classes for those with health conditions, practising with a group and qualities of the yoga teacher. Home practice was supported by course materials (manual, videos), as well as the teaching of techniques for everyday application that offered immediate benefits, such as breathing practices. Follow-up questionnaires revealed a key challenge was continuation of practice once the intervention had finished, with the structure of a class important in supporting practice.

**Conclusions:** Yoga4Health was a highly acceptable intervention to services users, which brought a range of biopsychosocial improvements, suggesting yoga is an appropriate intervention to offer on social prescription.

**Cole AK, Pearson T, Knowlton M. Comparing Aerobic Exercise with Yoga in Anxiety Reduction: An Integrative Review. Issues Ment Health Nurs. 2022 Mar;43(3):282-287. doi: 10.1080/01612840.2021.1965269. Epub 2021 Aug 26. PMID: 34436979**

**Abstract:**

Anxiety is a common mental health disorder that affects many Americans yet often goes unrecognized or undertreated. The purpose of this article is to review the current literature to assist in determining which alternative and complimentary therapy, aerobic exercise or yoga, is most beneficial in reducing anxiety symptoms. The literature search process resulted in a total of 14 articles included in the review. Results indicate that yoga is more effective in decreasing anxiety symptoms than aerobic exercise. Health care providers can use this information to help recommend an alternative form of therapy for patients.

**Corrigan L, Moran P, McGrath N, Eustace Cook J, Daly D. Characteristics and effectiveness of pregnancy yoga interventions: a systematic review and meta-analysis. BMC Pregnancy Childbirth. 2022 Mar 25;22(1):250. doi: 10.1186/s12884-022-04474-9. PMID: 35337282**

**Abstract:**

**Background:** Yoga is a popular mind-body medicine frequently recommended to pregnant women. Gaps remain in our understanding of the core components of effective pregnancy yoga programmes. This systematic review and meta-analysis examined the characteristics and effectiveness of pregnancy yoga interventions, incorporating the FITT (frequency, intensity, time/duration and type) principle of exercise prescription.

**Methods:** Nine electronic databases were searched: MEDLINE, PsycINFO, EMBASE, CINAHL, WHOLiS, AMED, ScieLo, ASSIA and Web of Science. Randomised control trials and quasi-experimental studies examining pregnancy yoga interventions were eligible. Covidence was used to screen titles, abstracts, and full-text articles. Outcomes of interest were stress, anxiety, depression, quality of life, labour duration, pain management in labour and mode of birth. The Cochrane Collaboration's Risk of Bias Assessment tool was used to assess methodological quality of studies and GRADE criteria (GRADEpro) evaluated quality of the evidence. Meta-analysis was performed using RevMan 5.3.

**Results:** Of 862 citations retrieved, 31 studies met inclusion criteria. Twenty-nine studies with 2217 pregnant women were included for meta-analysis. Pregnancy yoga interventions reduced anxiety (SMD: -0.91; 95% CI: - 1.49 to - 0.33;  $p = 0.002$ ), depression (SMD: -0.47; 95% CI: - 0.9 to - 0.04,  $P = 0.03$ ) and perceived stress (SMD: -1.03; 95% CI: - 1.55 to - 0.52;  $p < 0.001$ ). Yoga interventions also reduced duration of labour (MD = - 117.75; 95% CI - 153.80 to - 81.71,  $p < 0.001$ ) and, increased odds of normal vaginal birth (OR 2.58; 95% CI 1.46-4.56,  $p < 0.001$ ) and tolerance for pain. The quality of evidence (GRADE criteria) was low to very low for all outcomes. Twelve or more yoga sessions delivered weekly/bi-weekly had a statistically significant impact on mode of birth, while 12 or more yoga sessions of long duration ( $> 60$  min) had a statistically significant impact on perceived stress.

**Conclusion:** The evidence highlights positive effects of pregnancy yoga on anxiety, depression, perceived stress, mode of birth and duration of labour.

**Csepregi E, Gyurcsik Z, Veres Balajti I, Nagy AC, Szekanecz Z, Szsnto S. Effects of Classical Breathing Exercises on Posture, Spinal and Chest Mobility among Female University Students Compared to Currently Popular Training Programs. Int J Environ Res Public Health. 2022 Mar 21;19(6):3728. doi: 10.3390/ijerph19063728. PMID: 35329415**

**Abstract:**

Worldwide, university students' physical health and posture are declining due to a sedentary lifestyle. The aim of our study was to evaluate the effectiveness of physiotherapeutic breathing exercises on posture and spinal mobility among healthy female university students compared to other training methods. Sixty-one female students of the University of Debrecen were assigned to breathing exercise (BE;  $n = 15$ ), yoga (Y;  $n = 16$ ), Pilates (P;  $n = 15$ ) programmes and interval-training (IT;  $n = 15$ ). Each training session lasted one hour, performed twice a week for 7 weeks. Students were assessed using standardized clinical tests. All programmes resulted in significant improvement in chest expansion. Results of Schober's test showed substantial improvement using BE ( $p < 0.05$ ), Y, P ( $p \leq 0.01$ ) programmes. Significant changes in occiput-to-wall distance (Y, P  $p \leq 0.01$ ) (BE  $p \leq 0.001$ ) were observed in three groups except the IT group. Fingertip-to-floor test (Y, P  $p < 0.05$ ) results showed significant changes in two groups. The most outstanding effects on lateral flexion were

achieved using BE (right, left  $p \leq 0.001$ ) programme. A comparison with results achieved using yoga and Pilates revealed that the physiotherapeutic breathing exercise programme is an equally effective method to significantly improve spinal mobility and correct postural problems in healthy young women.

**Danon N, Al-Gobari M, Burnand B, Rodondi PY. Mind-body therapies effective for relieving cancer-related pain in adults? A systematic review and meta-analysis. *Psychooncology*. 2022 Mar;31(3):345-371. doi: 10.1002/pon.5821. Epub 2021 Sep 21. PMID: 34545984**

**Abstract:**

**Objective:** To assess whether mind-body therapies are effective for relieving cancer-related pain in adults, since at least one-third of adults with cancer are affected by moderate or severe pain.

**Methods:** We searched for all randomized or quasi-randomized controlled trials that included adults ( $\geq 18$  years) with cancer-related pain who were treated with mind-body therapies (mindfulness, hypnosis, yoga, guided imagery, and progressive muscle relaxation) in MEDLINE, Embase, CINAHL, Cochrane Central Register of Controlled Trials (CENTRAL), Science Citation Index, Web of Science, trials registers, and reference lists. The primary outcome was pain intensity. We calculated the standardized mean differences and 95% confidence intervals (CIs) and assessed the risk of bias.

**Results:** We identified 40 primary studies involving a total of 3569 participants. The meta-analysis included 24 studies (2404 participants) and showed a significant effect of -0.39 (95% CI -0.62 to -0.16) with considerable heterogeneity ( $I^2 = 86.3\%$ ,  $p < 0.001$ ). After we excluded four "outlier" studies in sensitivity analyses, the effect size remained significant but weaker. There was a high risk of bias in all studies, for example, performance bias due to lack of participant blinding. Patients in multiple settings were included but many studies were of low quality.

**Conclusions:** Mind-body therapies may be effective in improving cancer pain, but the quality of the evidence is low. There is a need for further high-quality clinical trials.

**Denham Jones L, Gaskell L, Spence N, Tim Pigott. Systematic review of the effectiveness of yoga on pain, physical function, and quality of life in older adults with chronic musculoskeletal conditions. *Musculoskeletal Care*. 2022 Mar;20(1):47-73. doi: 10.1002/msc.1576. Epub 2021 Jun 14. PMID: 34125986**

**Abstract:**

**Objectives:** Exercise interventions suitable for older adults can help to slow and manage age-related conditions. This systematic review looks at age-related musculoskeletal conditions in a population with a mean age over 50 years,

evaluating the effectiveness of yoga for pain, physical function, and quality of life.

**Methods:** CENTRAL, CINAHL, Pubmed, PsycInfo, SCOPUS, Sports Discus, Web of Science Core Collection, and Google Scholar were searched. Study selection and quality screening using the Cochrane risk of bias tool were conducted by two reviewers to mitigate bias. PRISMA guidelines were followed in conducting and reporting the review.

**Results:** 11 studies met inclusion criteria with a total sample of 2221 ( $\geq 70\%$  female). Eight studies measured pain, six showing significant effectiveness ( $p \leq 0.05$ ), for lower limb osteoarthritis (OA), hand OA, and neck pain. Nine studies measured physical function, four showing significant effects, for lower limb OA and sarcopenia. Significant quality of life effects were found for restless leg syndrome compared to baseline.

**Conclusion:** Moderate evidence was found for pain effects, generalisable for OA based on sub-group analysis. Effective trials were mostly short-term using at minimum one 60-min group class, and an average of four 30-min home practice sessions weekly. Findings support the use of props and modifications to address age-related physical limitations. Yoga was well-received with good adherence, but effects on a par with other exercise. There was an absence of quality of life effects in short term. Mixed methods studies could lead to further insight into the qualitative aspects of yoga practice for older adults.

**Dhansoia V, Majumdar V, Manjunath NK, Singh Gaharwar U, Singh D. Breathing-Focused Yoga Intervention on Respiratory Decline in Chronically Pesticide-Exposed Farmers: A Randomized Controlled Trial. Front Med (Lausanne). 2022 Mar 11;9:807612. doi: 10.3389/fmed.2022.807612. eCollection 2022. PMID: 35372380**

**Abstract:**

**Background:** Occupational exposure to pesticides has been associated with lung and cognitive function exacerbations. In the present study, we tested the effectiveness of breathing focused yoga intervention on alleviation of adverse respiratory and cognitive effects associated with chronic pesticide exposure in farmers.

**Methods:** We undertook a parallel, two-armed randomized controlled trial with blinded outcome assessors on a chronically pesticide-exposed farming population. The study was conducted at district Panipat, State Haryana located in the Northern part of India from November 2019 to August 2020. A total of 634 farmers were screened, and 140 farmers were randomized to breathing-focused yoga intervention (BFY,  $n = 70$ ) and waitlist control arms ( $n = 65$ ). BFY was delivered weekly in 45-min group sessions over 12 weeks followed by home-based practice. The primary outcome was the change in spirometry-based markers of pulmonary function from baseline expressed as raw values, Global Lung Initiative (GLI) percent predicted (pp), and GLI z-scores



after 24 weeks of intervention. Secondary variables were Trail making tests (TMT A and B), Digit symbol substitution (DSST), and WHO Quality of life-BREF (WHOQOL-Bref). Analysis was by intention-to-treat. Mediation analysis was done considering oxidative stress markers as potential mediators.

**Results:** At the end of 6 months of intervention, the overall follow-up in the participants was 87.85% (n = 123); 90% (n = 63) in the control group, and 85.71% in the yoga group (n = 60). The mean age of the study cohort (n = 140) was 38.75 (SD = 7.50) years. Compared with the control group, at 24 weeks post-intervention, the BFY group had significantly improved status of the raw sand z scores markers of airway obstruction, after adjusting for confounders, FEV1, FVC, FEF25-75 [z score-adjusted mean differences (95% CI); 1.66 (1.10-2.21) 1.88 (1.21-2.55), and 6.85 (5.12-8.57), respectively. A fraction of FEF25-75 change (mediation percentage 23.95%) was explained by glutathione augmentation. There were also significant improvements in cognitive scores of DSST, TMT-A and TMT-B, and WHOQOL-Bref.

**Conclusion:** In conclusion, regular practice of BFY could improve the exacerbations in the markers of airway obstruction in chronically pesticide-exposed farmers and cognitive variables. A significant mediating effect of glutathione augmentation was also observed concerning the effect of the intervention on FEF25-75. These findings provide an important piece of beneficial evidence of the breathing-based yoga intervention that needs validation across different farming ethnicities.

**Clinical Trial Registration:** www.ClinicalTrials.gov, identifier: CTRI/2019/11/021989.

**Estevao C. Role of yoga in inflammatory markers. Brain Behav Immun Health. 2022 Feb 1;20:100421. doi: 10.1016/j.bbih.2022.100421. eCollection 2022 Mar. PMID: 35199049**

### **Abstract:**

Yoga is an ancient system for integrating the mind, body, and spirit. In the *hatha yoga ashtanga* tradition (the eight limb Patanjali Yoga), three of the limbs are meditation, breathwork (*pranayama*) and physical postures (*asana*), which are widely practised in yoga classes. The benefits of yoga for mental and physical health are rooted in the practice's origins: in yoga, stress is said to be the root of all diseases. The established fields of psychoneuroimmunology and immunopsychiatry study the interplay between the immune system and mood or mental states. This mini-review has shifted the emphasis from research that focuses on yoga's benefits for stress, the most commonly studied outcome of yoga research, to a summary of the research on the effects of yoga practices on the immune system. The current literature bears strong evidence for the benefits of yoga on the levels of circulating cortisol and classical inflammatory markers, such as C-reactive protein (CRP) and cytokines such as interleukin-1 beta (IL-1 $\beta$ ), interleukin 6 (IL-6), tumour necrosis factor-alpha (TNF- $\alpha$ ) and interferon-gamma (INF- $\gamma$ ). The evidence for other less studied markers,

telomerase activity,  $\beta$ -endorphins, Immunoglobulin A (IgA) and brain-derived neurotrophic factor (BDNF) is also growing. This mini-review centres around the interplay between yoga and these markers in stress management and depression, vascular and immune function in the older population, cardiovascular and metabolic diseases, auto-immune diseases, breast cancer and pregnancy. Overall, the literature examined reveals the novelty of this field of research and sheds light on methodological challenges; however, it uncovers the potential for yoga to be used as adjuvant therapy in conditions with an inflammatory component.

**Gasteratos K, Papakonstantinou M, Man A, Babatsikos E, Tamalonis A, Goverman J. Adjunctive Nonpharmacologic Interventions for the Management of Burn Pain: A Systematic Review. *Plast Reconstr Surg.* 2022 Mar 18. doi: 10.1097/PRS.0000000000009059. Online ahead of print. PMID: 35311762**

**Abstract:**

**Background:** The conventional way of treating burn victims with mainstream pain control modalities is costly and has many negative side effects. In this study, the authors aim to present the findings from the major clinical trials on three nonpharmacologic interventions-hypnosis, virtual/augmented reality, and yoga-as supplements to conventional pain regimens for burn management.

**Methods:** A computerized literature search was conducted of the PubMed and ClinicalTrials.gov databases in April of 2020. The online screening process was performed by two independent reviewers with the Covidence tool. The protocol was reported using the Preferred Reporting Items for Systematic Review and Meta-Analyses, and it was registered at the International Prospective Register of Systematic Reviews of the National Institute for Health Research.

**Results:** The search yielded 254 articles from 1955 to 2020. Fifty-eight studies met the authors' inclusion criteria. Yoga reduced cognitive and somatic anxiety in burn survivors, and improved body image. Virtual reality is effective in pain reduction in both the pediatric and the adult burn population, and in faster burn wound reepithelialization. Hypnosis has similar results regarding reducing pain quality and anxiety in burn patients undergoing burn wound care and dressing changes but was not found to significantly accelerate the healing process.

**Conclusions:** Nonpharmacologic interventions are not a substitute for conventional analgesics; however, they could help patients have better control over their pain, greater self-esteem, and less postburn traumatic experiences. Burn care centers should consider nonpharmacologic interventions to improve patient satisfaction and their participation in the treatment and rehabilitation process.

**Giangregorio LM, Ponzano M. Exercise and physical activity in individuals at risk of fracture. Best Pract Res Clin Endocrinol Metab. 2022 Mar;36(2):101613. doi: 10.1016/j.beem.2021.101613. Epub 2022 Jan 6. PMID: 35210190**

**Abstract:**

This is a review of evidence and practical tips on exercise for individuals with osteoporosis, including individuals with hip and vertebral fractures. Balance and functional training, with or without strength training, can prevent falls. Several types of exercise can improve outcomes that are important to patients, such as physical functioning or quality of life. Individuals with osteoporosis should prioritize balance, functional and resistance training  $\geq$  twice weekly, where exercises, volume, intensity, and progression are aligned with the patient's goals and abilities. Patients who want to participate in other activities (e.g., walking, impact exercise, yoga, Pilates) can do them in addition to, but not instead of, balance and functional or strength training, if they can be done safely or modified. Avoid generic advice like "Don't bend or twist", which is difficult or impossible to operationalize, and may create fear and activity avoidance. Instead, be specific about the types of activities to avoid or modify, and provide tips on how to make daily activities safer, or signpost to resources from national osteoporosis societies. For example, not all bending or twisting is bad; it is activities that involve rapid, repetitive, sustained, weighted, or end range of motion twisting or flexion of the spine that may need to be modified, especially in individuals at high risk of fracture.

**Gunbakan O, Acar M. Effect of tele-yoga training in healthy women on menstrual symptoms, quality of life, anxiety-depression level, body awareness, and self-esteem during COVID-19 pandemic. Ir J Med Sci. 2022 Mar 24:1-13. doi: 10.1007/s11845-022-02985-0. Online ahead of print. PMID: 35332504**

**Abstract:**

**Background and aims:** This study was planned to examine the effects of tele-yoga training on menstrual symptoms, quality of life, anxiety-depression level, body awareness, and self-esteem in healthy women.

**Methods:** Thirty-two healthy premenopausal women between the ages of 18 and 45 were included in the study. The women were randomly divided into two groups as tele-yoga training (n: 16) and the control group (n: 16). The tele-yoga training was performed on the Zoom software for 6 weeks, 2 times a week and 45 min a day. No intervention was made in the control group. Menstrual pain and symptoms by Menstrual Symptom Scale (MSS), quality of life by Nottingham Health Profile (NHP), depression levels by Beck Depression Scale (BDS), anxiety levels by State and Trait Anxiety Scale (STAI), body awareness by Body Awareness Questionnaire (BAQ), and self-esteem by Rosenberg Self-Esteem Scale (RSES) were determined.

**Results:** In the tele-yoga training group, statistically significant improvements were observed in the MSS total ( $p = 0.001$ ), negative effects ( $p = 0.003$ ), menstrual pain symptoms ( $p = 0.003$ ), coping methods ( $p = 0.001$ ) sub-parameters, BDS score ( $p = 0.000$ ), NHP sleep ( $p = 0.021$ ), energy ( $p = 0.002$ ), emotional ( $p = 0.000$ ), and isolation ( $p = 0.039$ ) sub-parameters. In the control group, there was statistically significant worsening in the NHP total score ( $p = 0.000$ ). As regards the differences in values between the two groups, there were statistically difference in favor of the training group in sub-parameters of MSS, NHP sleep, energy, emotional, and isolation sub-parameters, and BDS and BAQ scores ( $p < 0.05$ ).

**Conclusion:** It is thought that tele-yoga training may be a safe and effective method in reducing menstrual symptoms and depression, increasing quality of life, and body awareness.

**Gurudut P, Jaiswal R. Comparative Effect of Graded Motor Imagery and Progressive Muscle Relaxation on Mobility and Function in Patients with Knee Osteoarthritis: A Pilot Study. Altern Ther Health Med. 2022 Mar;28(3):42-47. PMID: 33128533**

**Abstract:**

**Background:** Osteoarthritis (OA) is the most common musculoskeletal condition seen in aging. Joint destruction, chronic pain, change in proprioception, stability problems and decreased range of motion are the most common problems seen in OA. Complementary therapies like yoga, graded motor imagery (GMI), progressive muscle relaxation (PMR) and Tai Chi are more effective in chronic conditions such as knee OA.

**Aims:** The purpose of this study was to evaluate and compare the effect of graded motor imagery and progressive muscle relaxation on mobility and function in patients with knee OA.

**Methods:** This study was a randomized controlled pilot trial conducted in a tertiary health center in Belagavi, Karnataka, India.

**Participants:** A total of 11 patients with unilateral knee pain persisting for more than 12 months were included in the study.

**Interventions:** Patients were randomly assigned to 2 groups: the PMR group ( $n = 5$ ) or the (GMI) group ( $n = 6$ ). Patients in the PMR group practiced Jacobson's PMR and patients in the GMI group practiced explicit and mirror therapy. All patients were treated 5 times a week for 2 weeks.

**Outcome measures:** The outcome measures in this study were range of motion and the Western Ontario and McMaster University Osteoarthritis Index (WOMAC) score for assessing knee joint pain, function and stiffness.

**Results:** Results demonstrated knee flexion range ( $P = .046$ ) and function WOMAC scores ( $P = .0062$ ) were significantly better in the GMI group than in the PMR group.

**Conclusion:** GMI and PMR were both beneficial for knee mobility and function but GMI was better than PMR in chronic knee OA.

**Harbour E, Stoggl T, Schwameder H, Finkenzeller T. Breath Tools: A Synthesis of Evidence-Based Breathing Strategies to Enhance Human Running. Front Physiol. 2022 Mar 17;13:813243. doi: 10.3389/fphys.2022.813243. eCollection 2022. PMID: 35370762**

**Abstract:**

Running is among the most popular sporting hobbies and often chosen specifically for intrinsic psychological benefits. However, up to 40% of runners may experience exercise-induced dyspnoea as a result of cascading physiological phenomena, possibly causing negative psychological states or barriers to participation. Breathing techniques such as slow, deep breathing have proven benefits at rest, but it is unclear if they can be used during exercise to address respiratory limitations or improve performance. While direct experimental evidence is limited, diverse findings from exercise physiology and sports science combined with anecdotal knowledge from Yoga, meditation, and breathwork suggest that many aspects of breathing could be improved *via* purposeful strategies. Hence, we sought to synthesize these disparate sources to create a new theoretical framework called "Breath Tools" proposing breathing strategies for use during running to improve tolerance, performance, and lower barriers to long-term enjoyment.

**Haynes A, Gilchrist H, Oliveira JS, Grunseit A, Sherrington C, Lord S et al. What helps older people persevere with yoga classes? A realist process evaluation of a COVID-19-affected yoga program for fall prevention. BMC Public Health. 2022 Mar 8;22(1):463. doi: 10.1186/s12889-022-12818-5. PMID: 35255864**

**Abstract:**

**Background:** Falls among older people are a major global health concern. This process evaluation investigates the experience of participants aged 60+ in a yoga program aimed at preventing falls which transitioned from studio-based classes to online classes in response to COVID-19 restrictions. We sought to understand how the Successful AGEing (SAGE) yoga program functioned in both settings and as a hybrid program, and to explain why it worked well for most participants.

**Methods:** Realist process evaluation was used to explore the factors that facilitated a successful transition for most participants, and to consider why it did not work for a minority. This approach develops program theories that describe which mechanisms an intervention is (or is not) activating, and how

this is mediated by context to generate process outcomes. Data included interviews with participants (n = 21) and yoga instructors (n = 3), self-report feedback forms (n = 46), observation of classes and routine process measures.

**Results:** Factors that facilitated a successful transition for most participants included the quality of yoga instruction, the program format and inherent characteristics of yoga. Gains in transitioning online included continuity and greater convenience. Losses included perceived reduction in the effectiveness of yoga instruction. There were greater challenges for people struggling with pain and in disadvantageous home environments. We identified six program theories configured around 16 mechanisms: 1. It's worth the effort and 2. In expert hands (these had the same mechanisms: value expectancy, therapeutic alliance and achievement/mastery), 3. A communal experience (these mechanisms were shared experience, social connection, social comparison and peer checking), 4. Putting yoga within reach (accessibility, convenience, gratitude), 5. Building yoga habits (purposeful structure, momentum, accountability and continuity), and 6. Yoga's special properties (embodiment and mindfulness).

**Conclusions:** This study showed that online delivery of a yoga program for people aged 60+ retained much of the value of a face-to-face program for the majority of participants, and increased the value for some. The structured, communal nature of an organised group program delivered by a skilled instructor, together with yoga's intrinsic focus on mindfulness, facilitated continued engagement and perceived health benefits, despite the change in delivery mode.

**Jarbou NS, Newell KA. Exercise and yoga during pregnancy and their impact on depression: a systematic literature review. Arch Womens Ment Health. 2022 Mar 14. doi: 10.1007/s00737-021-01189-2. Online ahead of print. PMID: 35286442**

**Abstract:**

It is well established that exercise can improve depressive symptoms in the general population; however, it is not clear if these benefits are also seen in pregnancy. This review aimed to synthesize the evidence that examines whether exercise during pregnancy impacts depressive and associated symptoms (e.g. anxiety) during the perinatal period. The review was conducted in accordance with PRISMA guidelines and reporting criteria; literature was searched using PubMed, Scopus and Web of Science database engines. Clinical trials published in English evaluating the effects of a defined exercise protocol during pregnancy on depressive and/or anxiety symptoms during the perinatal period were included. Studies without a control group were excluded. Risk of bias was conducted by Cochrane assessment to appraise the quality of the included studies. Twenty-seven articles, between 1994 and 2019, were included. Of these, only 5 specifically recruited women with depression (n = 334), which all assessed a yoga-based intervention; 4 of these studies showed a statistically significant improvement in depressive and/or anxiety symptoms

in the intervention group compared to baseline; however, 2 of these studies also showed an improvement in the control group. The remaining 22 studies used various exercise interventions in pregnant women (n = 4808) with 20 studies reporting that exercise during pregnancy has the ability to improve depressive and/or anxiety measures in the perinatal period compared to either baseline or control. The evidence suggests that exercise of various types in pregnancy can reduce depressive and/or anxiety symptoms in the perinatal period in otherwise healthy women. Specifically in women with antenatal depression, the incorporation of yoga in pregnancy can improve depressive/anxiety symptoms in the perinatal period; however, this is based on a small number of studies, and it is not clear whether this is superior to non-exercise controls. Further studies are needed to determine the potential therapeutic effects of exercise of various types during pregnancy on symptoms of antenatal depression.

**Kala N, Telles S, Sharma SK, Balkrishna A. P300 Following Four Voluntarily Regulated Yoga Breathing Practices and Breath Awareness. Clin EEG Neurosci. 2022 Mar 23:15500594221089369. doi: 10.1177/15500594221089369. Online ahead of print. PMID: 35317637**

**Abstract:**

Attention was influenced by yoga breathing in previously published research. Each yoga breathing practice uniquely modifies specific breath characteristics. Differences in the study designs, assessment methods and interventions resulted in difficulty in comparing effects between yoga breathing practices. This study aimed (i) to compare four yoga breathing practices on attention using an auditory oddball task and (ii) to determine cardiac autonomic activity associated with attention using heart rate variability. P300 event related potential was recorded simultaneously with heart rate variability before and after 18-minute periods each of (i) high frequency yoga breathing (with increased breath frequency), (ii) bellows yoga breathing (with increased depth of respiration), (iii) alternate nostril yoga breathing (with alternate nostril patency), (iv) bumblebee yoga breathing (with prolonged exhale), (v) breath awareness (with attention to the breath) and (vi) quiet seated rest as control in 38 yoga experienced males (average age  $\pm$  SD; 24.08  $\pm$  4.01 years). The six sessions were on separate, randomly allocated days. The P300 peak amplitude recorded at Pz was significantly increased after four yoga breathing practices (Bonferroni adjusted *post-hoc* tests, repeated measures ANOVA). No significant changes were noted in heart rate variability following yoga breathing or control sessions. These findings suggest that the four yoga breathing practices increase the attentional neural resources engaged for this auditory oddball task, irrespective of the characteristic of breath uniquely regulated in the four yoga breathing practices.

**Kaur H, Chaudhary S, Mohanty S, Sharma G, Kumaran SS, Ghati N et al. Comparing cognition, coping skills and vedic personality of individuals practicing yoga, physical exercise or sedentary lifestyle: a cross-sectional**

**fMRI study. Integr Med Res. 2022 Mar;11(1):100750. doi: 10.1016/j.imr.2021.100750. Epub 2021 May 24. PMID: 34194974**

**Abstract:**

**Background:** Nature and intensity of physical activity may influence cognition, coping mechanisms and overall personality of an individual. The objective of this cross-sectional study was to compare cognition, coping styles and vedic personality among individuals practicing different lifestyle.

**Methods:** Thirty-nine healthy young adults of both gender (27.63±4.04 years) were recruited and categorized into three groups; i.e. yoga, physical activity or sedentary lifestyle groups. Participants were assessed on cognition, coping styles and Vedic personality inventory (VPI). Verbal-n-back and Stroop tasks were performed using 3 Tesla MRI scanner. Task Based Connectivity (TBC) analysis was done using CONN toolbox in SPM.

**Results:** There were no significant differences in the cognitive domains across the groups. The planning (p=0.03) and acceptance domain (p=0.03) of the Brief COPE scale showed difference across the groups. Post-hoc analysis revealed that planning and acceptance scores were distinctly higher in the physical activity group, however, there was no difference between physical activity group and yoga practitioners. Similarly, in the VPI, Sattva (p=0.003), Rajas (p=0.05) and Tamas (p=0.01) were different across the groups, and the post hoc analysis showed superiority in Sattva scores in Yoga group, meanwhile, both Rajas and Tamas were higher in the physical activity group. Yoga practitioners preferentially recruited left Superior Frontal Gyrus in relation to the physically active group and precuneus in relation to the sedentary lifestyle group.

**Conclusion:** The study revealed that yoga practitioners had a distinct higher sattva guna and preferentially recruited brain areas associated with self-regulation and inhibitory control.

**Kim KV, Bartley J, Ashe MC, Bardai Z, Butt DA, Chilibeck PD et al. Effect of yoga on health-related outcomes in people at risk of fractures: A systematic review. Appl Physiol Nutr Metab. 2022 Mar;47(3):215-226. doi: 10.1139/apnm-2021-0736. Epub 2021 Dec 16. PMID: 34914565**

**Abstract:**

We summarized the effects of yoga on health-related outcomes and adverse events in men and postmenopausal women ≥50 years-old at increased risk of fracture, to inform the updated Osteoporosis Canada clinical practice guidelines. Six databases were searched for observational studies, randomized controlled trials and case series. Certainty of evidence was assessed using the Grading of Recommendations, Assessment, Development and Evaluation handbook. Nine studies were included and reported using narrative syntheses due to the limited available evidence. Overall, the available evidence was of



very low certainty. There was no effect of yoga on health-related quality of life in randomized trials. Effects on other health-related outcomes were mixed or not available in the literature. Five studies reported no adverse events directly related to the study intervention, and 2 studies did not report whether adverse events occurred. However, 2 case series reported vertebral fractures related to yoga participation, possibly due to excessive spinal flexion. Due to the limited and very low certainty evidence, guideline developers will need to draw indirect evidence from yoga studies among middle aged or older adults that are not at fracture risk. PROSPERO: CRD42019124898.

**Novelty:** Evidence in general was of very low certainty. Yoga had no effect on health-related quality of life in randomized trials. Evidence was mixed or unavailable for other outcomes. Case studies reported yoga poses involving spinal flexion coincided with incidents of vertebral compression fracture among older adults with increased fracture risk.

**Koch S, Esch T, Werdecker L. Effects of a Yoga-Based Stress Intervention Program on the Blood Pressure of Young Police Officers: A Randomized Controlled Trial. J Integr Complement Med. 2022 Mar;28(3):234-240. doi: 10.1089/jicm.2021.0294. Epub 2022 Jan 13. PMID: 35294298**

**Abstract:**

**Objectives:** Despite improvements in health education and treatment, arterial hypertension remains a major health problem of increasing epidemiological importance. The purpose of this randomized controlled trial was to determine the impact of regular yoga breathing exercises on blood pressure, work-related stress, and the prevalence of arterial hypertension in young police academy trainees with no existing comorbidities.

**Design:** A single-center, prospective, randomized controlled trial.

**Subjects:** The study included 120 healthy trainees aged between 18 and 39 years who practiced weekly yoga exercises with an emphasis on breathing (prāṇāyāma) over an observation period of 6 months.

**Results:** These regular exercises lowered the blood pressure of the participants by 1.34 mmHg (right arm,  $p = 0.007$ ), increased their regenerative capacity (Recovery Experience Questionnaire [REQ] scale +2.77,  $p < 0.001$ ) and resilience (Resilience Scale [RS] +4.6,  $p = 0.001$ ), and concomitantly reduced the level of perceived stress (Perceived Stress Scale [PSS] -0.9,  $p < 0.001$ ). In contrast, blood pressure in the control group had slightly increased over the study period by 0.1 mmHg (right arm,  $p < 0.001$ ) and 1.0 mmHg (left arm,  $p = 0.03$ ), and subjective scores had significantly worsened (REQ scale -3.4,  $p < 0.001$ ; RS -2.29,  $p = 0.001$ ; PSS +0.88,  $p < 0.001$ ).

**Conclusions:** The results point to a significant correlation between blood pressure and both regenerative capacity and stress level. Thus, the study

confirms the hypothesis that yoga exercises reduce perceived stress and exert positive effects on blood pressure.

**Clinical Trial Registration Number:** DRKS00025921.

**Krause Sorio B, Siddarth P, Kilpatrick L, Milillo MM, Aguilar Faustino Y, Ercoli L et al. Yoga Prevents Gray Matter Atrophy in Women at Risk for Alzheimer's Disease: A Randomized Controlled Trial. J Alzheimers Dis. 2022 Mar 11. doi: 10.3233/JAD-215563. Online ahead of print. PMID: 35275541**

**Abstract:**

**Background:** Female sex, subjective cognitive decline (SCD), and cardiovascular risk factors (CVRFs) are known risk factors for developing Alzheimer's disease (AD). We previously demonstrated that yoga improved depression, resilience, memory and executive functions, increased hippocampal choline concentrations, and modulated brain connectivity in older adults with mild cognitive impairment.

**Objective:** In this study (NCT03503669), we investigated brain gray matter volume (GMV) changes in older women with SCD and CVRFs following three months of yoga compared to memory enhancement training (MET).

**Methods:** Eleven women (mean age = 61.45, SD = 6.58) with CVRF and SCD completed twelve weeks of Kundalini Yoga and Kirtan Kriya (KY + KK) while eleven women (mean age = 64.55, SD = 6.41) underwent MET. Anxiety, resilience, stress, and depression were assessed at baseline and 12 weeks, as were T1-weighted MRI scans (Siemens 3T Prisma scanner). We used Freesurfer 6.0 and tested group differences in GMV change, applying Monte-Carlo simulations with alpha = 0.05. Region-of-interest analysis was performed for hippocampus and amygdala.

**Results:** Compared to KY + KK, MET showed reductions in GMV in left prefrontal, pre- and post-central, supramarginal, superior temporal and pericalcarine cortices, right paracentral, postcentral, superior and inferior parietal cortices, the banks of the superior temporal sulcus, and the pars opercularis. Right hippocampal volume increased after yoga but did not survive corrections.

**Conclusion:** Yoga training may offer neuroprotective effects compared to MET in preventing neurodegenerative changes and cognitive decline, even over short time intervals. Future analyses will address changes in functional connectivity in both groups.

**Lee EC, Adams W, Sandoval Skeet N, Hoyt A, Lee K. Yoga as an adjunct activity for medical students learning anatomy. BMC Med Educ. 2022 Mar 17;22(1):188. doi: 10.1186/s12909-022-03236-7. PMID: 35300665**

## **Abstract:**

**Background:** Medical students experience high levels of stress during training due to demanding course loads which often leaves less time for self-care. This study combines the self-care technique of yoga with learning anatomical locations, innervations, actions, and functions of the muscles and organs to determine if anatomy tests scores are improved and whether students' stress levels attenuate from participating in yoga.

**Methods:** In this randomized controlled study, 64 student volunteers were randomized into either a yoga intervention group or wait list control group throughout the M1 anatomy course. The yoga group (n = 32) participated in 8 yoga sessions synced with the anatomy topics they were learning in lecture. The wait list group (n = 32) went through their normal anatomy curriculum but had an option to participate in the same yoga sessions after the anatomy course. The primary research purpose was to determine whether yoga improved anatomy exam performance by comparing four anatomy exam scores between the two groups. The secondary research purposes included the following: to determine whether yoga classes including anatomy teaching still conferred acute and long-lasting stress relief by, respectively, comparing a students' own pre- and post-yoga stress level and self-perceived stress levels between the two groups; and to determine if a student's confidence in anatomy was improved after a yoga session.

**Results:** There was no significant difference in anatomy exam performance between students who received yoga and those on the waitlist (all  $p > 0.05$ ). For students who received yoga, their average self-reported stress levels decreased after each yoga session, their average DASS (Depression, Anxiety and Stress Scale) score decreased after a yoga session, but they were not significantly less stressed than their waitlist peers prior to an exam, and their self-reported confidence in anatomy material related to the back, upper extremity, head and neck, and abdomen/pelvis increased.

**Conclusion:** With this sample, there was no evidence that yoga sessions paired with anatomy lecture material improved overall anatomy exam performance, as opposed to only the musculoskeletal portion which other studies have looked at. However, yoga acutely reduced stress levels, and subjective feelings of knowledge improvement were noted by participants. Both of these can provide benefits to medical students.

**Mak C, Whittingham K, Cunnington R, Chatfield M, Boyd RN. Six-month follow-up of a mindfulness yoga program, MiYoga, on attention, executive function, behaviour and physical outcomes in cerebral palsy. Disabil Rehabil. 2022 Mar;44(6):967-973. doi: 10.1080/09638288.2020.1783582. Epub 2020 Jun 26. PMID: 32589851**

## **Abstract:**

**Purpose:** A randomised controlled trial (RCT) of a mindfulness-based yoga program, MiYoga, for cerebral palsy (CP) demonstrated improved attention in children and decreased mindfulness in parents post-intervention. This paper evaluates the retention of treatment effects at 6-months follow-up.

**Methods:** 42 children with CP and their parents participated in a RCT with two groups MiYoga (n = 21) and Waitlist control group (n = 21). Waitlist control participants were offered MiYoga following the post-intervention assessment. 23 out of 42 child-parent dyads from both groups completed follow-up assessment 6-months after completing MiYoga. This paper evaluates and reports data from both groups collapsed (n = 23; MiYoga n = 11; and waitlist control n = 12; 47.8% male; mean age = 9:10 ± 2.4 years) to assess retention from post-MiYoga to follow-up and pre-MiYoga to follow-up. The primary outcome was attention, measured by Conner's Continuous Performance Test II (CCPT). Secondary outcomes included child executive function, physical function, behaviour, quality of life, child and parent mindfulness, personal wellbeing, psychological wellbeing and parent-child relationship.

**Results:** Paired t-tests showed no significant changes between post-MiYoga to follow-up and pre-MiYoga to follow-up for variables that showed an intervention effect immediately after MiYoga, namely, children's attention variables and parent's mindfulness. Paired t-tests showed that children's executive function and physical function and parent's wellbeing improved significantly from pre-MiYoga to 6-months follow-up which may potentially reflect sleeper or delayed effects of MiYoga.

**Conclusion:** This study identified possible delayed or sleeper effects in children's executive function and physical function and parent's well-being. Implications for rehabilitation 6-month follow-up evidence for retention of effects of MiYoga on children's attention was inconsistent; therefore, booster sessions or continued practice of MiYoga as a lifestyle option are needed to maintain an effect on attention. Because MiYoga can be practised during daily activities, it may provide additional support for children with CP, complementing standard rehabilitation options. By embedding mindfulness in children and parents' daily activities, MiYoga, could provide families with accessible and time-efficient means of learning and practicing mindfulness.

**Mathur P, Leburu S, Kulothungan V. Prevalence, Awareness, Treatment and Control of Diabetes in India From the Countrywide National NCD Monitoring Survey. Front Public Health. 2022 Mar 14;10:748157. doi: 10.3389/fpubh.2022.748157. eCollection 2022. PMID: 35359772**

**Abstract:**

**Background:** To determine the prevalence, awareness, treatment and control of diabetes mellitus (DM) and associated factors amongst adults (18-69 years) in India from the National Noncommunicable Disease Monitoring Survey (NNMS).

**Methods:** NNMS was a comprehensive, cross-sectional survey conducted in 2017-18 on a national sample of 12,000 households in 600 primary sampling units. In every household, one eligible adult aged 18-69 years were selected. Information on NCD risk factors and their health-seeking behaviors were collected. Anthropometric measurements, blood pressure and fasting capillary blood glucose were measured. DM was defined as fasting blood glucose (FBG)  $\geq 126$  mg/dl including those on medication. Awareness, treatment, and control of DM were defined as adults previously diagnosed with DM by a doctor, on prescribed medication for DM, and FBG  $< 126$  mg/dl, respectively. The weighted data are presented as mean and proportions with 95% CI. We applied the Student t-test for continuous variables, Pearson's chi-square test for categorical variables and multivariate regression to determine the odds ratio. For statistical significance, a p-value  $< 0.05$  was considered.

**Results:** Prevalence of DM and impaired fasting blood glucose (IFG) in India was 9.3% and 24.5% respectively. Among those with DM, 45.8% were aware, 36.1% were on treatment and 15.7% had it under control. More than three-fourths of adults approached the allopathic practitioners for consultation (84.0%) and treatment (78.8%) for diabetes. Older adults were associated with an increased risk for DM [OR 8.89 (95% CI 6.66-11.87) and were 16 times more aware of DM. Better awareness, treatment and control levels were seen among adults with raised blood pressure and raised cholesterol.

**Conclusions:** The prevalence of DM and IFG is high among adults, while the levels of awareness, treatment and control are still low in India, and this varied notably between the age groups. Multifaceted approaches that include improved awareness, adherence to treatment, better preventive and counseling services are crucial to halt diabetes in India. Also, expanding traditional systems of medicine (Ayurveda, Yoga, Naturopathy, Unani, Siddha, and Homeopathy [AYUSH]) into diabetes prevention and control practices open solutions to manage this crisis.

**Moonaz S, Whitehead AM, Lawrence L, Natividad D, Kindred D, Nielsen A et al. Yoga therapy DYADS: A novel approach to chronic pain management in underserved populations. Explore (NY). 2022 Mar-Apr;18(2):195-199. doi: 10.1016/j.explore.2020.12.002. Epub 2020 Dec 13. PMID: 33342752**

**Abstract:**

Yoga therapy is an emerging integrative health approach that applies the practices and teachings of yoga for individuals with clinical concerns. It is generally offered as individual sessions between a yoga therapist and client or in a small group setting with several clients who share a clinical concern. Here we describe a third model for consideration- the yoga therapy dyad. A dyad includes two clients working simultaneously with a single yoga therapist and differs from both individual and small group sessions in the potential benefits and challenges. The yoga therapy dyad model that is detailed here was implemented as part of a feasibility trial along with group acupuncture therapy for chronic pain in an underserved population. Underserved populations are

at risk for pain and reduced access to care. This pilot may inform future research, policy, education, and clinical practice.

**Munoz Casabella A, Wahner Roedler DL, Croghan IT, Petterson TM, Fuehrer DL, Bauer BA. Use of Complementary and Integrative Medicine Among Patients With Glioblastoma Multiforme Seen at a Tertiary Care Center. Glob Adv Health Med. 2022 Mar 25;11:2164957X221078543. doi: 10.1177/2164957X221078543. eCollection 2022. PMID: 35360507**

**Abstract:**

**Background:** Glioblastoma multiforme (GBM) is among the most aggressive and lethal tumors, with a median survival of 12-15 months. Many patients use complementary and integrative medicine (CIM) therapies to supplement their cancer treatment.

**Objective:** To determine the prevalence of CIM use and identify the most frequently used types of CIM in a cohort of patients with GBM seen at a tertiary care medical center in the United States.

**Methods:** An anonymous survey was mailed through the US Postal Service from August 1, 2019, through February 21, 2020, to patients with GBM.

**Results:** A total of 346 surveys were mailed, and 146 responses (42%) were received. The median age of respondents was 61 years (range, 52-68 years), and 85 (58%) were male. Most patients had undergone surgery (90%), chemotherapy (96%), and radiotherapy (95%). The median time from diagnosis of GBM to survey participation was 18 months (range, 12-31 months). Most respondents (81%) used some form of CIM, most frequently meditation (22%), relaxation and other stress management techniques (19%), chiropractic therapy (16%), and acupuncture (12%). Compared with men, women more commonly meditated (32% vs 16%;  $P = .046$ ) and practiced yoga (20% vs 6%;  $P = .04$ ). We observed age-based differences, with younger patients more commonly meditating, practicing relaxation and stress management techniques, and receiving chiropractic therapy ( $P < .05$  for all).

**Conclusions:** Providers should encourage patients with GBM to discuss their interest in CIM therapies and guide them to evidence-based treatments that may help improve their quality of life.

**Naderi M, Kordestani H, Sahebi Z, Khedmati Zare V, Amani Shalamzari S, Kaviani M et al. Serum and gene expression profile of cytokines following combination of yoga training and vitamin D supplementation in breast cancer survivors: A randomized controlled trial. BMC Womens Health. 2022 Mar 24;22(1):90. doi: 10.1186/s12905-022-01671-8. PMID: 35331230**

**Abstract:**

**Background:** This study aimed to examine the effect of the combination of yoga training with high vitamin D dose supplementation on the expression and systemic levels of inflammatory cytokines and psychophysical status of breast cancer survivors.

**Methods:** Thirty volunteered breast cancer survivors ( $48 \pm 8$  years) were randomly allocated to a high dose (4000 IU) of vitamin D supplementation (HD) group ( $n = 10$ ), yoga with a high dose of vitamin D (YHD) group ( $n = 10$ ), and yoga with a low dose (2000 IU) of vitamin D (YLD) group ( $n = 10$ ). Participants performed the Hatha yoga style for 12 weeks, twice a week. Blood samples, quality of life (QoL) questionnaire, and physical performance tests were taken before and after the intervention.

**Results:** Body fat percentage ( $\eta p^2 = 0.36$ ), handgrip strength ( $\eta p^2 = 0.41$ ) and QoL indicators include global health ( $\eta p^2 = 0.54$ ), functional scales ( $\eta p^2 = 0.49$ ), and symptoms scales ( $\eta p^2 = 0.50$ ) were significantly improved in the both YHD and YLD groups compared to the HD group ( $p < 0.05$ ). Also, interleukin-10 (IL-10) levels were markedly increased in the Y-HVD group compared to the Y-LVD and HVD groups. Moreover, there were significant decreases in tumor necrosis factor- $\alpha$  (TNF- $\alpha$ ) and interleukin-6 levels in the Y-HVD group after the intervention. The anti-inflammatory index (IL-10/TNF- $\alpha$ ) was significantly increased in both the yoga groups ( $P < 0.05$ ).

**Conclusion:** Yoga promotes physical and psychological fitness and, in combination with a high dose of vitamin D, improves the cytokine profile, which can effectively manage the side effects associated with cancer. Trial registration IRCT20210726051993N2. Registration date: 2022/02/27. URL: <https://www.irct.ir/trial/62079>.

**Nair RG, Vasudev MM, Mavathur R. Role of Yoga and Its Plausible Mechanism in the Mitigation of DNA Damage in Type-2 Diabetes: A Randomized Clinical Trial. Ann Behav Med. 2022 Mar 1;56(3):235-244. doi: 10.1093/abm/kaab043. PMID: 34180500**

**Abstract:**

**Background:** Although yoga is found to be beneficial in the management of type 2 diabetes (T2D), its mechanism of action is poorly understood. T2D is also known to be associated with increased oxidative stress (OS) and DNA damage.

**Purpose:** This study examines how yoga modulates OS-induced DNA damage and the efficiency of DNA repair in T2D conditions.

**Methods:** In this assessor-masked randomized clinical trial, T2D subjects ( $n = 61$ ), aged (Mean  $\pm$  SD,  $50.3 \pm 4.2$ ) were randomly allocated into Yoga group (31) that received 10 weeks of yoga intervention and Control (30) with routine exercises. Molecular and biochemical assessments were done before and after

the intervention period. Structural Equation Modeling using "R" was used for mediation analysis.

**Results:** At the end of the 10th week, Yoga group showed significant reduction in DNA damage indicators like Tail Moment (-5.88[95%CI: -10.47 to -1.30];  $P = .013$ ) and Olive Tail Moment (-2.93[95%CI: -4.87 to -1.00];  $P < .01$ ), oxidative DNA damage marker 8-OHdG (-60.39[95%CI: -92.55 to -28.23];  $P < .001$ ) and Fasting Blood Sugar (-22.58[95%CI: -44.33 to -0.83];  $P = .042$ ) compared to Control. OGG1 protein expression indicating DNA repair, improved significantly (17.55[95%CI:1.37 to 33.73];  $P = .034$ ) whereas Total Antioxidant Capacity did not (5.80[95%CI: -0.86 to 12.47];  $P = 0.086$ ). Mediation analysis indicated that improvements in oxidative DNA damage and DNA repair together played a major mediatory role (97.4%) in carrying the effect of yoga.

**Conclusion:** The beneficial effect of yoga on DNA damage in T2D subjects was found to be mediated by mitigation of oxidative DNA damage and enhancement of DNA repair.

**Newman JR, Durben N, Baumann K, Lambing AY, Nichols CD, Witkop M et al. Physical therapy within US HTC: A multicentre survey of utilization, practice patterns and pain management approaches. Haemophilia. 2022 Mar;28(2):343-350. doi: 10.1111/hae.14501. Epub 2022 Feb 13. PMID: 35152533**

**Abstract:**

**Introduction:** Practice patterns and utilization of physical therapists (PTs) affiliated with Hemophilia Treatment Centers (HTCs) in the United States (US) are not well known.

**Aims:** Describe utilization, role responsibilities and practice patterns of US HTC PTs. Identify practice patterns specifically focusing on assessment and treatment of pain. Recognize gaps in utilization and role responsibilities of PTs as part of the multidisciplinary team and suggest guidelines for PT involvement within the HTC.

**Methods:** Respondents were a subset of a convenience sample of healthcare providers who responded to a non-validated survey developed by a multidisciplinary panel of haemophilia experts.

**Results:** A 33.0% response-rate ( $n = 59$ ) representing all regions of US HTCs was achieved. Those working  $\geq 10$  hours per week were more likely to provide nutrition education ( $P = .026$ ) and surgical options education ( $P < .001$ ). Those who billed insurance for their services during comprehensive visits were more likely to provide education regarding surgical options ( $P = .046$ ). The majority of PTs (95.0%) evaluated pain regardless of time spent in clinic and felt comfortable treating pain. Fifty-eight percent used a formal pain measurement tool and more likely to use a formal pain measurement tool if billing insurance ( $P = .004$ ). Top five non-pharmacologic treatments recommended for pain



management included splints/braces (84.8%), aquatic therapy (74.6%), orthotics (71.2%), surgical options (47.5%) and yoga (32.2%).

**Conclusions:** This study demonstrated PT utilization across HTC centres varies widely. Gaps in care may be addressed through salary support, funded education, greater regional/national collaboration of PTs specializing in bleeding disorders and advocacy for insurance coverage for appropriate services.

**O'Shea M, Capon H, Evans S, Agrawal J, Melvin G, O'Brien J et al. Integration of hatha yoga and evidence-based psychological treatments for common mental disorders: An evidence map. J Clin Psychol. 2022 Mar 21. doi: 10.1002/jclp.23338. Online ahead of print. PMID: 35315071**

**Abstract:**

**Background:** Interest in the use of yoga to enhance engagement with and augment the benefits of psychological treatment has grown. However, a systematic approach to reviewing existing research examining the use of yoga with psychological treatment is lacking.

**Materials and methods:** This mapping review identified and synthesised research trialling yoga as an integrated or adjunct therapy with evidence-based psychological interventions for the treatment of anxiety, depression, PTSD, and eating disorders.

**Results:** Overall, the review identified ten published and three unpublished studies, representing either single group or small quasi-experimental research designs.

**Discussion:** Limited but promising findings were shown for yoga with CBT for anxiety and depression, and the integration of yoga within intensive treatment models for PTSD.

**Conclusions:** Future research is encouraged to focus on controlled trials that enable examination of the component effect of yoga when applied with evidence-based psychological treatment and acceptability and feasibility data to further knowledge regarding a role for yoga in clinical practice.

**O'Shea M, Capon H, Skvarc D, Evans S, McIver S, Harris J et al. Pragmatic preference trial of therapeutic yoga as an adjunct to group cognitive behaviour therapy versus group CBT alone for depression and anxiety. J Affect Disord. 2022 Mar 15;307:1-10. doi: 10.1016/j.jad.2022.03.028. Online ahead of print. PMID: 35301041**

**Abstract:**

**Background:** Yoga has several mechanisms that make it a promising treatment for depression and anxiety, including physical activity, behavioural

activation, and mindfulness. Following positive outcomes from adapted CBT interventions incorporating mindfulness-based practices, this study explored the effects of a therapeutic yoga program as an adjunct to group-based CBT for depression or anxiety.

**Methods:** This was a pragmatic preference trial involving adults diagnosed with depression or anxiety in a regional primary mental healthcare service (n = 59), comparing transdiagnostic group CBT (n = 27) with transdiagnostic group CBT combined with an adjunct therapeutic yoga program (n = 32). A preference recruitment design allowed eligible participants (n = 35) to self-select into the adjunct program. The Depression Anxiety Stress Scale-21 (DASS) was assessed at baseline, post-intervention, and three-months follow up.

**Results:** CBT + Yoga was an acceptable alternative to CBT alone. Significant reductions were observed in total DASS scores and the 3 subscales of the DASS for both groups, however CBT + Yoga showed significantly lower depressive and anxiety symptoms post-intervention, compared to CBT alone. CBT + Yoga also showed sustained reductions in depressive symptoms over three-months, and more rapid reductions in depressive symptoms, compared to CBT alone.

**Limitations:** These findings should be considered preliminary due to the moderate sample size, with a rigorous randomised control trial necessary to definitively support the integration of yoga within mental health care to augment the benefits and uptake of transdiagnostic CBT for depression and anxiety.

**Conclusions:** Complementing other mindfulness-based practices, therapeutic yoga shows promise as an adjunct to transdiagnostic CBT.

**Regan EW, Wende M, Blake C, Fritz S. Yoga for everyone: A qualitative study of a community yoga class for people with disability. *Physiother Theory Pract.* 2022 Mar;38(3):401-411. doi: 10.1080/09593985.2020.1765438. Epub 2020 May 18. PMID: 32419567**

**Abstract:**

**Background and Objective:** People with mobility impairments face increased barriers to physical activity. The study aimed to understand the lived experiences of individuals with disability who are regular participants in the Yoga for Everyone class to inform future research, intervention and community programs.

**Methods:** A phenomenological qualitative approach utilized semi-structured interviews and class observations. Data was analyzed through iterative inductive thematic analysis.

**Results:** Six people of varied mobility limitations participated. Thematic analysis revealed themes on influential environmental and personal factors, a

holistic-focused class environment, physical improvements, mental/emotional impact, and a sense of belonging to community.

**Conclusion:** The Yoga for Everyone class fostered multi-faceted outcomes for people with diverse movement impairments. Focusing on community-clinical partnerships, utilizing a class structure with volunteers, and fostering an ongoing inclusive social environment are potential strategies for success in other community programs for those with disability.

**Sadacharan CM. Effects of multi-component exercise on older adults with chronic conditions. J Sports Med Phys Fitness. 2022 Mar 25. doi: 10.23736/S0022-4707.22.13697-2. Online ahead of print. PMID: 35333032**

**Abstract:**

**Background:** Multicomponent exercises involving eccentric contraction (ECC) exercise, chair yoga (CY) and tai chi (TC) are practiced extensively to treat older adults with chronic conditions. The study investigated the effect of CY and TC performance after various intensity of ECC exercise induced muscle pain, delayed onset of muscle sores (DOMS), and strength in sedentary older adults.

**Methods:** Nine sedentary older adults with chronic condition(s) aged between 60 and 90 performed CY and TC after ECC exercise protocol for 9 weeks. The medical pre-protocol, ECC exercise, CY, and TC performance, subjective (health activities of daily living (ADL) difficulty scale; visual analog scale (VAS), and DOMS), objective (pressure pain threshold (PPT)), and medical post-protocol assessments were carried out and compared the physical status before and after the protocol.

**Results:** Our results show that functional limitations, DOMS, VAS, and PPT levels were improved in the CY and TC performed weeks 3, 4, 7, and 8 compared to ECC exercise weeks 2 and 6. The manual muscle testing (MMT), active range of motion (AROM), and maximal voluntary isometric contraction (MVIC) were improved and showed significant differences on the weak muscle groups. The mean Tinetti balance and gait score, and general endurance showed significant difference.

**Conclusions:** Our findings have important implications for clinical exercise prescription as low perceived CY and TC, and ECC exercise might suit well for older adults with chronic conditions. Performing multicomponent exercises can help to reduce the risk of injury from falls and prevent age-related mobility, balance, and physical function decline in older adults.

**Saroj SK, Bhardwaj T. Non-pharmacological interventions for tobacco cessation: A systematic review of existing practices and their effectiveness. Monaldi Arch Chest Dis. 2022 Mar 25. doi: 10.4081/monaldi.2022.2229. Online ahead of print. PMID: 35347975**

**Abstract:**

Smoking tobacco is associated with lung cancer and other life-threatening diseases which requires serious action to curb it. Tobacco cessation interventions are available as pharmacological and non-pharmacological methods or a combination of both. The present review examines the effectiveness of the existing non-pharmacological tobacco cessation interventions and synthesizes the result for the future development of drug-free treatment in the community for tobacco cessation. The literature search was conducted in August 2020, using two electronic databases (PubMed and JSTOR), with search terms: ['tobacco cessation' OR 'smoking cessation'] AND ['intervention'] which included studies published during 2010 and 2020 (till 31st July 2020). All studies were limited to English language, human participants and excluded patients with comorbidities. A total of 2,114 publications were retrieved out of which 11 articles were reviewed. On the basis of intervention used in reviewed studies, we categorized them into seven categories: i. incentive-based intervention, ii. exercise based, iii. telephone-based proactive counselling, iv. mobile phone SMS (Short Message Service) based, v. smartphone app (application) based, vi. web-based intervention, vii. self-help material. Incentives were provided in most of the studies to maintain the retention rate and motivate the participants for completing follow-up. Non-pharmacological interventions for tobacco cessation include a combination of various elements. Our findings suggest that behavioural counselling is one of the most important elements of any non-pharmacological intervention. In addition to behaviour counselling, yoga and exercises along with self-help material, video and phone counselling may have higher efficacy. Thus, practicing non-pharmacological interventions may also increase the cessation rate and reduce the tobacco use burden.

**Sefat O, Salehinejad MA, Danilewitz M, Shalhaf R, Vila-Rodriguez F. Combined Yoga and Transcranial Direct Current Stimulation Increase Functional Connectivity and Synchronization in the Frontal Areas. Brain Topogr. 2022 Mar;35(2):207-218. doi: 10.1007/s10548-022-00887-z. Epub 2022 Jan 29. PMID: 35092544**

**Abstract:**

Transcranial direct current stimulation (tDCS) is a non-invasive neuro-stimulation technique that can modulate cortical excitability. Similarly, yoga is shown to affect the brain's neural activity and networks. Here, we aimed to investigate the effect of combined yoga and tDCS on brain oscillations and networks using resting-state electroencephalography recordings. In a randomized, cross-over, double-blind design, twenty-two healthy subjects participated in a yoga/active tDCS session (2 mA; 20 min; anode-F3, cathode F4) or yoga/sham tDCS on 2 separate days. Resting-state EEG data were collected before and after each intervention. Power spectral density (PSD) and functional connectivity, measured by a synchronization measure, phase-locking value, were computed for each condition. There were no significant

differences in PSD values among the two interventions. The network-based statistic method was employed for detecting functional connectivity differences between yoga/active and yoga/sham tDCS interventions. Results show that the addition of active tDCS to yoga is associated with increased functional connectivity of the scalp and source EEG data in the frontal area. The changes were widespread, intra-hemispheric, and inter-hemispheric connections, which were mainly between the frontal area to other regions. At the source level, most of the connectivity changes were found in the fronto-parietal network. These findings suggest that combining yoga with tDCS might lead to brain network changes related to the executive and attentional functions.

**Sivashankar JT, Surenthirakumaran R, Doherty S, Sathiakumar N. Implementation of a non-randomized controlled trial of yoga-based intervention to reduce behavioural issues in early adolescent school-going children in Sri Lanka. *Global Health*. 2022 Mar 5;18(1):27. doi: 10.1186/s12992-022-00819-3. PMID: 35248094**

**Abstract:**

**Background:** Adolescence can be difficult to navigate and the post-conflict environment in Jaffna Province, Sri Lanka compounds existing issues for adolescents. Conduct problems, hyperactivity along with emotional problems are challenges faced by adolescents, particularly in fragile, post-conflict settings. This study was a non-randomized controlled trial carried out in 4 educational zones over 6 months. The study implemented a yoga-based intervention package: two types of slow breathing for 5-6 min, Surya-namaskaram for 6-8 min, and mindfulness meditation for 5-6 min. Pre/post quantitative assessments were conducted with intervention and control groups. A focus group was conducted with the intervention group. The aim was to evaluate. Effectiveness of implementing a yoga-based intervention package in grade 8 school children (early adolescents) to address behavioural problems.

**Results:** Paired t-test and independent t-tests were completed for both arms using statistical product and service solutions (SPSS21). Parents' assessments of emotional issues reduced for the intervention group ( $n = 584$ ) [ $t(584) = 11.41$ ,  $p = 0.001$ ] along with reduction of the total difficulty score [ $t(584) = 28.12$ ,  $p = 0.001$ ]. Teachers' assessments indicated prosocial scores improved in the intervention group [ $t(584) = - 28.5$ ,  $p = 0.001$ ]. Students' self-assessments in the intervention group indicate a reduction in emotional problems [ $t(584) = 6.4$ ,  $p = 0.001$ ], and reduction in problems with peers [ $t(584) = 14.4$ ,  $p = 0.001$ ]. Within the control group ( $n = 499$ ), teachers' assessments indicated emotional problems increased [ $t(499) = - 9.5$ ,  $p = 0.001$ ] and prosocial scores reduced [ $t(499) = 13.5$ ,  $p = 0.001$ ]. Students' self-assessments in the control group indicated emotional problems increased [ $t(499) = - 27.1$ ,  $p = 0.001$ ]. A comparison of post-test scores revealed a statistically significant difference between groups. Focus group results indicate students felt the intervention had an overall positive effect on school achievements, family dynamics and individual health.

**Conclusions:** This yoga-based intervention package appeared to be effective in reducing both externalizing and internalizing symptoms in adolescents. Practicing Surya-namaskaram, breathing control techniques and mindfulness meditation significantly reduced both externalizing symptoms (conduct problems and hyperactivity) as well as internalizing symptom (emotional problem and peer problems). It is recommended this intervention be scaled up across Sri Lanka and other similar post-conflict regions.

**Solakoglu O, Dogruoz Karatekin B, Yumusakhuylu Y, Mesci E, Icgasioglu A. Effect of Yoga Asana "Vrksasana (Tree Pose)" on Balance in Patients With Postmenopausal Osteoporosis: A Randomized Controlled Trial. Am J Phys Med Rehabil. 2022 Mar 1;101(3):255-261. doi: 10.1097/PHM.0000000000001785. PMID: 33990483**

**Abstract:**

**Objective:** In this study, the effect of the add-on effect of the Tree Pose (Vrksasana) on the balance of patients with postmenopausal osteoporosis was investigated.

**Design:** Thirty-two patients with postmenopausal osteoporosis were randomly assigned to conservative exercise group (30 mins/d for 12 wks) or Tree Pose-added exercise group (30-min conventional exercise + 2-min Tree Pose/d for 12 wks) by Microsoft Excel randomization option. The balance of the patients was evaluated with Berg Balance Scale, Timed Up and Go Test, single-leg standing test, tandem walk test, tandem stance test, and Korebalance static&dynamic balance tests at baseline, sixth week, and third month of the exercise program.

**Results:** There was no statistically significant difference on baseline data between groups. There was a statistically significant difference between the two groups in the sixth-week measurement of single-leg stance ( $P < 0.05$ ). In the Berg Balance Scale, static balance test, dynamic balance test, and tandem walk test, a statistically significant difference was found among baseline, sixth-week, and 12th week measurements in both the exercise group and the Tree Pose-added exercise group.

**Conclusions:** Gains in the static and dynamic balance of postmenopausal osteoporotic patients can be obtained by adding "Vrksasana" to conventional exercises.

**Trial registration:** ClinicalTrials.gov NCT03882853.

**Staudt MD, Prabhala T, Sheldon BL, Quaranta N, Zakher M, Bhullar R et al. Current Strategies for the Management of Painful Diabetic Neuropathy. J Diabetes Sci Technol. 2022 Mar;16(2):341-352. doi: 10.1177/1932296820951829. Epub 2020 Aug 28. PMID: 32856490**

**Abstract:**

The development of painful diabetic neuropathy (PDN) is a common complication of chronic diabetes that can be associated with significant disability and healthcare costs. Prompt symptom identification and aggressive glycemic control is essential in controlling the development of neuropathic complications; however, adequate pain relief remains challenging and there are considerable unmet needs in this patient population. Although guidelines have been established regarding the pharmacological management of PDN, pain control is inadequate or refractory in a high proportion of patients. Pharmacotherapy with anticonvulsants (pregabalin, gabapentin) and antidepressants (duloxetine) are common first-line agents. The use of oral opioids is associated with considerable morbidity and mortality and can also lead to opioid-induced hyperalgesia. Their use is therefore discouraged. There is an emerging role for neuromodulation treatment modalities including intrathecal drug delivery, spinal cord stimulation, and dorsal root ganglion stimulation. Furthermore, consideration of holistic alternative therapies such as yoga and acupuncture may augment a multidisciplinary treatment approach. This aim of this review is to focus on the current management strategies for the treatment of PDN, with a discussion of treatment rationale and practical considerations for their implementation.

**Tremont G, Davis J, Ott BR, Uebelacker L, Kenney L, Gillette T et al. Feasibility of a Yoga Intervention for Individuals with Mild Cognitive Impairment: A Randomized Controlled Trial. J Integr Complement Med. 2022 Mar;28(3):250-260. doi: 10.1089/jicm.2021.0204. Epub 2022 Jan 13. PMID: 35294301**

**Abstract:**

**Background:** Yoga is a potentially low risk intervention for cognitive impairment that combines mental and physical practice and includes instruction on breathing, stress reduction, and mindfulness meditation. Previous research documents that yoga can target modifiable risk factors for mild cognitive impairment (MCI) progression. The authors describe a randomized feasibility trial of yoga for individuals with MCI.

**Methods:** Participants were 37 individuals with amnesic MCI who were randomly assigned to receive 12 weeks of twice-weekly yoga intervention (YI) or healthy living education (HLE) classes. Acceptability and feasibility were assessed by tracking adverse events, class attendance, and participant satisfaction. Participants completed neuropsychological and mood measures as well as measures of potential intervention mechanisms at baseline and immediately postintervention.

**Results:** Participants in both conditions reported high levels of satisfaction and reasonable class attendance rates. Home practice rates were low. There were no adverse events deemed related to the YI. Results showed a medium effect size in favor of the YI in visuospatial skills. The yoga group also showed

a large effect size indicating decline in perceived stress compared with the HLE group, whereas HLE resulted in greater reductions in depressive symptoms after the intervention (large effect size).

**Conclusions:** Study findings indicated that the YI was safe, modestly feasible, and acceptable to older adults with MCI. The authors found preliminary evidence that yoga may improve visuospatial functioning in individuals with MCI. Results support stress reduction as a possible mechanism for the YI. Future studies should address a YI in a larger sample and include strategies to enhance engagement and home practice.

**Uebelacker LA, Cherenack EM, Busch A, Baker JV, Pinkston M, Gleason N et al. Pharmacologic and Non-Pharmacologic Treatments for Chronic Pain Used by Patients with Pain, HIV, and Depression. AIDS Behav. 2022 Mar;26(3):864-873. doi: 10.1007/s10461-021-03447-x. Epub 2021 Sep 1. PMID: 34468967**

**Abstract:**

The objective of this study was to understand pain treatment utilization, perceived efficacy, and differences in utilization by gender, clinic site, chronicity of pain, pain severity, and depression severity among people living with HIV (PLWH), chronic pain, and elevated depression symptoms. Participants included 187 PLWH at three HIV clinics in the U.S. Overall, 85% of participants reported taking a pain medication. One quarter (25%) reported non-pharmacological professional treatments for pain (e.g., massage, physical therapy), 60% reported mind-body treatments, including exercise, meditation, and yoga, and 62% reported other non-pharmacological self-administered treatments (e.g., heat/cold). Most pain treatments were considered "slightly helpful" or "moderately helpful." Non-pharmacological self-administered treatments were more commonly used among women than men and among individuals with constant vs. intermittent pain. Further research is needed to evaluate the efficacy of the preferred analgesic modalities of PLWH.

**Valenzuela PL, Saco Ledo G, Santos Lozano A, Morales JS, Castillo Garcia A, Simpson RJ et al. Exercise Training and Natural Killer Cells in Cancer Survivors: Current Evidence and Research Gaps Based on a Systematic Review and Meta-analysis. Sports Med Open. 2022 Mar 4;8(1):36. doi: 10.1186/s40798-022-00419-w. PMID: 35244811**

**Abstract:**

**Background:** Exercise training can positively impact the immune system and particularly natural killer (NK) cells, at least in healthy people. This effect would be of relevance in the context of cancer given the prominent role of these cells in antitumor immunity. In this systematic review and meta-analysis, we aimed to summarize current evidence on the effects of exercise training on the levels and function of NK cells in cancer survivors (i.e., from the time of diagnosis until the end of life).



**Methods:** Relevant articles were searched in PubMed, Scopus, Web of Science and Cochrane Central Register of Controlled Trials (until January 11, 2022). Randomized controlled trials (RCT) of exercise training (i.e., non-acute) interventions vs usual care conducted in cancer survivors and assessing NK number and/or cytotoxic activity (NKCA) before and upon completion of the intervention were included. Methodological quality of the studies was assessed with the PEDro scale, and results were meta-analyzed using a random effects (Dersimoian and Laird) model.

**Results:** Thirteen RCT including 459 participants (mean age ranging 11-63 years) met the inclusion criteria. Methodological quality of the studies was overall fair (median PEDro score = 5 out of 10). There was heterogeneity across studies regarding cancer types (breast cancer, non-small cell lung cancer and other solid tumors), treatment (e.g., receiving vs having received chemotherapy), exercise modes (aerobic or resistance exercise, Tai Chi, Yoga) and duration (2-24 weeks). No consistent effects were observed for NK number in blood (mean difference [MD]: 1.47, 95% confidence interval [CI] - 0.35 to 3.29,  $p = 0.113$ ) or NKCA as assessed in vitro (MD: - 0.02, 95%CI - 0.17 to 0.14,  $p = 0.834$ ). However, mixed results existed across studies, and some could not be meta-analyzed due to lack of information or methodological heterogeneity.

**Conclusions:** Current evidence does not support a significant effect of exercise training intervention on NK cells in blood or on their 'static response' (as assessed in vitro) in cancer survivors. Several methodological issues and research gaps are highlighted in this review, which should be considered in future studies to draw definite conclusions on this topic.

**Wu Q, Liu P, Liao C, Tan L. Effectiveness of yoga therapy for migraine: A meta-analysis of randomized controlled studies. J Clin Neurosci. 2022 Mar 10;99:147-151. doi: 10.1016/j.jocn.2022.01.018. Online ahead of print. PMID: 35279587**

**Abstract:**

**Introduction:** The efficacy of yoga therapy for migraine remains controversial. We conduct this meta-analysis to explore the influence of yoga therapy on the treatment efficacy of migraine.

**Methods:** We have searched PubMed, EMBASE, Web of Science, EBSCO and Cochrane library databases through February 2021, and included randomized controlled trials (RCTs) assessing the efficacy of yoga therapy for migraine attack.

**Results:** Five RCTs involving 356 patients were included in the meta-analysis. Overall, compared with control group for migraine, yoga therapy was associated with substantially reduced headache frequency (SMD = -1.43; 95% CI = -2.23 to -0.64;  $P = 0.0004$ ) and HIT-6 score

(SMD = -2.19; 95% CI = -4.09 to -0.28; P = 0.02), but revealed no obvious influence on pain intensity (SMD = -1.37; 95% CI = -2.76 to 0.01; P = 0.05) or McGill Pain Questionnaire (SMD = -2.09; 95% CI = -6.39 to 2.22; P = 0.34).

**Conclusions:** Yoga therapy may benefit to reduce the headache frequency of migraine patients.

**Zaccari B, Loftis JM, Haywood T, Hubbard K, Clark J, Kelly UA. Synchronous Telehealth Yoga and Cognitive Processing Group Therapies for Women Veterans with Posttraumatic Stress Disorder: A Multisite Randomized Controlled Trial Adapted for COVID-19. Telemed J E Health. 2022 Mar 29. doi: 10.1089/tmj.2021.0612. Online ahead of print. PMID: 35357957**

**Abstract:**

**Background:** Providing care over telehealth grew slowly until the COVID-19 pandemic. Since the onset of the COVID-19 pandemic, providing mental health care was readily adapted to virtual means; however, clinical trial research is nascent in adapting methods and procedures to the virtual world.

**Methods:** We present protocol modifications to pivot a multisite randomized controlled trial study, conducted at Southeastern and Pacific Northwestern Veterans Affairs Health Care Systems, from being conducted in-person to virtually, following the onset of the COVID-19 pandemic. We measured outcomes of posttraumatic stress disorder (PTSD) symptoms and psychophysiological markers of stress among female Veterans with PTSD secondary to military sexual trauma. We collected qualitative data about provider and participant experiences with telehealth.

**Results:** Across sites, 200 participants were consented (48 virtually), 132 were randomized (28 to virtual groups), and 117 completed data collection and treatment (69 completed all or some data collection or treatment virtually).

**Conclusions:** The pivots made for this study were in response to the COVID-19 pandemic and offer innovative procedures leveraging technology and contributing to the broader landscape of conducting research virtually.