CHAPTER 3

3.0 Scientific review

3.1 Scientific Literature review of Yoga and Substance use
[Table 1]

S/no	Citation	Sample Size	Design/Duration	Variable study	Result	Summary
1	(Anju et al., 2015)	84 (experimental n = 55, control group n =29	Randomized control trial 3 days 12 hrs	i, WHO Quality of life Brief Scale	Sky has significant increase in physical, psychological and environment domains but urine screen test results were negative when drugs, was not taken	SKY program had effective treatment prognosis in substance abusers
2	(Hallgren, Romberg, Bakshi, & Andreasson, 2014)	55 women	RCT 8 weeks CBT(3&6 months follow up)	i, Smoking self-efficacy ii, Anxiety (STAIT) iii, Smoking situation temptation scale iv, CESD- 10 (depression symptoms) v, Fagerstrom tolerance questionnaire	Yoga group had significant reduction in alcohol consumption compared with treatment as usual	Yoga helps to sustain alcohol cessation
3	(Shahab, Sarkar, & West, 2013)	96 subjects	Randomized control trial	i, The Shiffman-Jarvis scale ii, The Fagerstrom test	Yogic breathing techniques helped to control craving among smokers to smoke in the post intervention period	Yoga breathing helped abstinent cigarette smoker
4	(Bock et al., 2012)	55 women	Randomized control trial 8 weeks (3 and 6 follow	i, Smoking history and nicotine dependence (FTND) ii, Anxiety (STAIT)	*Vinyasa* yoga program established higher rates of smoking cessation in women smokers	*Vinyasa* yoga helps to sustain smoking cessation

			up)	iii, Depressive symptoms (CESD-10) iv, Short- form health survey; SF- 36)		
5	(Elibero, Janse Van Rensburg, & Drobes, 2011)	76 daily smokers	Randomized control trial	i, The Questionnaire of Smoking Urges–brief	*Hatha* yoga and aerobic exercise showed positive results in craving and helps to promote positive health	*Hatha* yoga & aerobic exercise can reduce cigarette craving among chain smokers
6	(Khalsa, Khalsa, Khalsa, & Khalsa, 2008)	8 subjects *Kundalini* yoga	Repeated measure design 90 days (3 & 12 months follow up)	i, The Perceived Stress Scale ii, Behavior and Symptom identification Scale iv, Quality of Recovery Index	*Kundalini* yoga treatment showed significant improvement in recovering patients with substance use disorders	*Kundalini* yoga practisner achieved flexibility, physical strength, increased energy levels, clearer complexion, more focused & better eye contact
7	(Bowen et al., 2006)	173 (57 VM, 116 TAU) Follow up in 3 Months (29 VM,58TAU) 6 Months (27 VM, 51 TAU)	Randomized control trial 10 days course	i, The life orientation test ii, The brief symptom inventory iii, The white bear suppression inventory iv, Drinking related locus of control scale v, The short inventory of problems vi, The daily drug taking questionnaire vii, The daily drinking questionnaire	*Vipasana* meditation participants showed decrease in alcohol-related problems and psychiatric symptoms as well as increase in positive psychosocial outcomes	*Vipassana* meditation participants had significant improvement in psychiatric symptoms, controlling alcohol intake and higher levels of optimism

8	(Vedamurtha char et al., 2006)	60 subjects	Randomized control trial (3 weeks)	i, Beck Depression Inventory ii, Plasma cortisol, ACTH and Prolactin were measured	*Sudarshana Kriya* yoga in alcohol-dependent subjects showed reduction in stress-hormone levels (Cortisol and ACTH) along with depression	*Sudarshana Kriya* yoga showed major antidepressant effects among alcohol-dependent after acute phase of detoxification and had lower plasma level of ACTH

3.2 Scientific Literature review on Physical exercise based intervention [Tables 2]

S/no	Citation	Sample Size	Design	Variable study	Result	Summary
1	(Loprinzi & Kane, 2015)	87 young adults	Randomized controlled design(12 months)	i, Cognitive assessments Trial making test ii, Sedentary behavior questionnaires	Acute bouts of moderate intensity exercise had significantly higher result in concentration related cognition compared then cognitive assessment without exercise	Acute moderate intensity exercise has positive effect in sedentary behavior, fitness and executive functions
2	(Nishiguchi et al., 2015)	48 older adults (exercise 24, control 24)	Randomized controlled design(12 weeks)	i, Trail Making Test ii, Wechsler Memory Scale iii, Mini-Mental State Examination	Multi model exercise significantly improved memory, executive function and the efficiency of brain activation in older adults	Physical exercise with cognitive program helped to improve the efficacy of brain activity in older adults
3	(Lee & Kim,	68 males	Single group	i, Body Composition	Physical activity along	Physical activity had

	2014)	adolescents	study (16 weeks obesity intervention)	Analyzed ii, Exercise Self- efficacy Scale iii, The Decision Balance Scale iv, Leisure-Time Physical Activity Scale	with obesity intervention and behavior based motivation intervention had significant contribution to reduce BMI on male obese	positive significance among obese adolescents and positively changed their psychological variable
4	(Henchoz et al., 2014)	4748 Swiss young men 15 months follow up study	Cross-sectional study	i, Physical Activity Questionnaire ii, Risky Single Occasion Drinking	Sports and physical activity had positive association with at-risk use of cigarettes, cannabis and alcohol	Exercise and sports has association to lower prevalence of substance use
5	(Hu et al., 2014)	198 mild cognitive impairment subjects (exercise96,control group102)	Longitudinal study (randomly selected)	i, The Chinese Mini- Mental Status Examination ii, The Revised Activity of Daily Living Scale iii, Activity of Daily Living Scale	Physical exercise showed significant improvement in cognitive function (immediate memory and delay recall function) physical abilities and body movement capacity	Active exercise can successfully promote cognitive function among ageing people with mild cognitive impairment and decrease the dementia problem
6	(Martinsen & Sundgot-Borgen, 2014)	677 athletes & matched controls (n= 421 students)	Cross-sectional study	i, Questionnaire Cigarettes, alcohol & illicit drug performance-enhancing illicit drug use (no, occasionally, every day)	The study indicates higher prevalence of smoking, and alcohol use in adolescent athletes	Sports culture helped to reduce the use of drugs
7	(Hogan et al., 2013)	30 adolescents	Randomized controlled design	i, Go/No Go Task ii, EEG Recording	Physical fitness and aerobic exercise showed significant improvement in cognitive function by increasing the efficacy of attention	Physical fitness and aerobic exercise helped adolescents to be fit and react faster

8	(Magnan, Kwan, & Bryan, 2013)	354 elite athletes	Randomized controlled design	i, Seven days Physical Activity Recall Scale ii, Exercise Self–Efficacy Scale iii, The PAAS (Lox et al., 2000)	Bout of moderate intensity exercise showed higher levels of positive effects and tranquility and lower level of negative effects and fatigue on elite athletes	Bout exercise helps to increase positive effects and reduce negative effects and fatigue in elite athletes
9	(Berg et al., 2012)	African American light smokers (n = 539)	Randomized control design study	i, Smoking self-efficacy questionnaire	Exercise brought better control in smoking behaviors and improve self-efficacy in light smokers	Regular exercise and walking helped to reduce risk factors and other health issues
10	(Horn et al., 2011)	High school student (n = 233)	Randomized control design	Self-classified, 7 days point prevalence quit rates (3 and 6 months after baseline) and carbon monoxide validation (3-month follow-up)	The N-O-T +FIT group had significantly higher cessation rates compared with those in the N-O-T and BI group	Adding physical activity to N-O-T may enhance smoking cessation
11	(Taylor-Piliae et al., 2010)	TaiChi 37, Western exercise 39, and control group 56 in healthy adults	Randomized control design	i, Digit- Spam Tests ii, Physical Activity Questionnaire iii, Animal–Naming Tests iv, Sit-&-Reach Tests v, The Single–Leg stance Test	Cognitive functioning showed that western physical exercise had better improvement in upper body flexibility than TaiChi and TaiChi had greater results in balancing the body	TaiChi, & western exercise had a positive impact in various functional domains, & cognitive function in healthy adults
12	(Luft et al., 2009)	30 high level track & field athletes (23 males, 7 females)	Cross-sectional study	i, Detection or Simple Reaction Time ii, Identification or Choice Reaction Time iii, Working Memory or One-Back Task	High-level track field athletes showed significantly increased in sympathetic modulation and HRV	Correlation between HRV and cognitive performance among high level track field athletes showed stronger significance after

				iv, One Card Learning Task v, Continuous Monitoring Task vi, HRV measures		physical exercise
13	(Brown et al., 2010)	Drug-dependent individuals (n = 16)	Pre–post study design	i, Time-line follow back (Sobell & Sobell, 1996)	Aerobic exercise increased cardiorespiratory fitness and abstinence from alcohol & drugs	Aerobic exercise adjunct for drug treatment of substance abusers
14	(Lucas et al., 2009)	60 athletes (100 hrs exercise)	Pre-post study	i, Biodex Isokinetic Dynamometer ii, Monark Cycle Ergometer iii, Repco Cycle Ergometer vertical Jump Tester iv, Stroop Test	100 hrs of competitive exercise helped on complex decision making during sustained stress and had moderate impact on functional performance on upper and lower limbs	Exercise helps to reduce stress level and show impact on functional performance
15	(Weinstock et al., 2008)	Drug-dependent individuals (n = 187)	Randomized clinical trials	i, Addiction Severity Index (McClellan et al., 1992)	Exercise related activities had a longer duration of abstinence from substance use	Exercise had a beneficial outcome for individuals undergoing SUD treatment
16	(Nabkasorn et al., 2006)	59 adolescent women mild to moderate depression	Randomized clinical trials (16week)	i, Depressive symptoms CES-D Scale ii, Radioimmunoassay iii, Liquid Chromatography iv, Spirometer	Physical exercise with jogging reduced excretions of stress hormones and significantly decrease resting heart rate, increase peak oxygen uptake and improve lung capacity	Physical exercise had a positive result in depressive score, excretion of cortisol and epinephrine in urine
17	(Hillman et al., 2006)	241 community-dwelling individuals	Cross sectional study	i, Wechsler Adult Intelligence Scale ii, Erikson Flanker Task iii, Dutch Adaption of the	Physical activity showed beneficial effect on general and selective aspects of cognition in older adults	Physical exercise had good impact on cognitive function in older adults

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18	(Werch et al., 2003)	465 students	Randomized control trials (3groups)	i, The Youth Alcohol & Health Survey ii, Youth Risk Behavior Survey iii, Sport Consultation plus Alcohol Preventive Consultation	Regular physical exercise, and counseling to students about health habits, with and without parents had potentially reduced the length of alcohol use	Regular exercise, healthy well-being, and psychic counseling is effective to reduce alcohol use
19	(Kulig et al., 2003)	High school student (n = 15,349)	Cross-sectional survey	i, Youth risk behavior & Cigarettes, alcohol & illicit drug use questionnaire	Physically active students were less likely to be substance users or engage in sexual risk behaviors	Physical exercise & Team sports activity were associated with lower prevalence of health risk behaviors
20	(Kirkcaldy et al., 2002)	Adolescents = 1000 (aged 14–18 years)	Cross-sectional survey	i, Cigarettes, beer & marijuana use questionnaire	Adolescent with regular physical activity had lower anxiety & depression scores and display much less social behavioral inhibition	Exercise provides more positive social feedback and recognition towards society,
21	(Field, Diego, & Sanders, 2001)	High school students (n=89)	Cross-sectional design	i, Cigarettes, alcohol & illicit drug use questionnaire	High level of exercise lowers the frequency of drug use and substance abusers are less depressed	Regular exercise had positive impact to lower depression and maintain good relationship with their parents
22	(Collingwood et al., 2000)	High school students (n = 329)	Pre–post design study	i, Questionnaire cigarette, smokeless tobacco, and illicit drug use ii, The general well- beings scale	Physical fitness helps to lower substance abuse risk factors and substance use	Physical exercise had a favorable effect on substance abuse risk factors and use patterns

3.3 Scientific Literature review of Substance abuse and Mindfulness
[Tables 3]

S/no	Citation	Sample size	Design/ Duration	Outcomes measures variable study	Result	Summary
1	(Brewer et al., 2009)	Alcohol/cocaine use disorder–36	Comparative study (1 week)	i, Stress	Mindfulness training has shown promising result for stress-related maladies and efficacious in targeting stress	Mindfulness training was better complementary therapy to reduce stress than CBT
2	(Glasner-Edwards et al., 2017)	63 subjects (MBRP-=31,HE=32	Randomized control study,12 weeks	i, The Beck Depression Inventory ii, Beck Anxiety Inventory iii, The Addiction Severity Index	MBRP group had a positive impact on psychiatric severity score among patients with depression and anxiety disorders	MBRP helped to reduce negative affect and psychiatric symptoms among stimulant-dependent adults.
3	(Leigh et al., 2005)	Under graduate college population–196	Correlative study	i, Freiburg Mindfulness Inventory	Increased spirituality scores helps to reduce uses of alcohol and tobacco in college students	Mindfulness and spirituality were negatively correlated with alcohol, tobacco, smoking and frequent drinking habits
4	(Britton et al., 2010)	SUD–55 subjects	Correlated study,(8, 20, & 60 weeks))	i, Psychological distress ii, Sleep quality iii, Mindfulness practice iv, Substance use questionnaires	Mindfulness meditation is interrelated with sleep duration and has good prognosis for substance abuse	Mindfulness meditation was found useful in substance abuse adolescent to promote quality of sleep
5	(Davis, Manley, Goldberg, Smith, &	175 (low socioeconomic status smokers)	Randomized control study	i, Patient Health Questionnaire ii,The Wisconsin Tobacco Quit Line	Mindfulness Training compared to novel smoking cessation treatment showed	Mindfulness training decreases desire to smoke and stress levels and increases awareness which associates

	Jorenby, 2014).				significantly lower in measures of urges and perceived stress.	with smoking relapse
6	(Iranshahri & Jenaabadi, 2015)	30 under treatment male addicts	Quasi-experimental study	i, Craving Beliefs Questionnaire ii, Random sampling method iii, Depression Anxiety, Stress Scale	Mindfulness based therapy was effective in controlling drug craving, decreases stress, anxiety and depression	Mindfulness based therapy can be the alternative therapy to reduce the craving, stress anxiety and depression
7	(Garland et al., 2016)	180 homeless men (MORE=64,CBT=64,TAU=52)	Randomized control study (10 weeks)	i, Penn Alcohol Craving Scale ii, Brief Symptom Inventory iii, The Five Facet Mindfulness Questionnaire iv, Positive & Negative Affect Schedule v, PTSD Checklist Civilian version	MORE showed improvement in substance craving, negative effects and post-traumatic stress than CBT and had positive affect in post-traumatic stress than TAU	MORE is designed as integrative therapy to improve self-regularity affected by substance use
8	(Bowen et al., 2009)	168 adults with substance abuse	8 week (2&4 months follow up)	i, The Acceptance & Action Questionnaire ii, The Five Factor Mindfulness Questionnaire iii, The Penn Alcohol Craving Scale iv, Short Inventory of Problems	MBRP program showed lower rates of substance use, reduction in craving and builds acceptance to act with awareness compared to TAU	MBRP would be alternative therapy for substance use disorders and it helps to change fundamental maladaptive patterns of behavior

				v, The Timeline Follow back		
9	(Witkiewitz & Bowen, 2010)	168 Subjects	Randomized control design (8 weekly)	i, Beck Depression Inventory ii, Penn Alcohol Craving Scale	Mindfulness-Based Relapse Prevention therapy reduces substance use & craving	MBRP provides evidence for incorporating mindfulness practice into substance abuse treatment
10	(Imani et al., 2015)	28 outpatients	Randomized control trial (8 weeks)	i, The five factor mindfulness questionnaire ii, The Addiction Sevier index	MBGT patient group had decreased mean score of alcohol and opium but increased mean score of describing, non-judging and non-reacting	Mindfulness based group therapy should be the selective protocol in health-care setting for substance use disorders
11	(Garland, Gaylord, Boettiger, & Howard, 2010)	53 alcohols depended on adult	Randomized control trial	i, Self-report measures, ii. Psychophysiological cue-reactivity iii, Alcohol attention bias	Mindfulness training significantly reduces stress and thought suppression and increases physiological recovery from alcohol dependence	MT can be used to reduce stress level, thought suppression and improve recovery from alcohol dependence
12	(Fishbein et al., 2016)	85 Adolescents students	Randomized control design (50-min yoga 3 times a week	i, The physical activity readiness questionnaire ii, Abbreviated Dysregulation Inventory iii, Response Stress Questionnaire iv, Five Facet Mindfulness v, Brunel Mood Scale vi, Behavior Assessment Scale vi, Stress Task	Mindfulness yoga practice helps to decrease alcohol use and enrich social skills	Yoga had impactful result on substance abuse in context of psychophysiological and psychological risks

3.4 Scientific Literature review of Substance use and Self-control

[Table 4]

S/ No	Citation	Sample Size	Design/Duration	Outcome measure/ Variable study	Result	Summary
1	(Pokhrel et al., 2013)	Subjects– 1040	Randomized controlled trials	i, Social self-control ii, Peer substance use iii, Baseline substance use	Self-control improves interpersonal functioning, their relation with drug using friends and substance use behavior	Adolescents influenced by drug using friends and their substance use behavior is improved by self-control
2	(Muraven & Shmueli, 2006)	Subjects– 160 social drunker	Pre–post Comparative study	i, Squeezing a handgrip ii, Self-stopping task	Alcoholics have worse performance in self-control task	Self-control reduces negative outcomes after alcohol and high temptation to drink
3	(Malouf et al., 2012)	Subjects-485 adult jail inmates	Comparative study	i, Pre-incarceration substance misuse scale ii, Self-control	Substance abusers had lower self-control and have more symptoms of substance misuse and influence	Self-control has direct relationship with substance-abusing friends
4	(Wills & Stoolmiller, 2002)	Subjects- 1526 students	Comparative study	i) Self control ii) Latent growth models	Good self-control subjects showed lower rate of substance abuse	Subjects with lower self-control have a higher chance of using drugs
5	(Allahverdipour et al., 2006)	Subjects– 183, high school student (male)	Comparative study	i, Self-control scale ii, Resistance self-efficacy scale iii, Behavioral intention not to use drugs scale iv, Substance abuse-related behaviors scale	Subjects involve in drugs by influence of friends and violence from guardians and have poor self-control and smoking habits	Social self-control training skills help to prevent substance abuse

6	(Wills, Ainette, Stoolmiller, Gibbons, & Shinar, 2008)	Subjects– 1767, public school students	Longitudinal design	i, Self-control scale	Good self-control reduces the risk factors like family life events, adolescent life events, and peer substance abuse	Good self-control reduces risk factors of substance abuse
7	(Sureka et al., 2014)	230 male prisoners	Randomized control trial (6 weeks)	i, The mini-mental state examination ii, Global assessment of functioning scale iii, Psychological general well-beings schedule iv, Schedule for clinical assessment in Neuropsychiatry	*Sudarsan Kriya* yoga has positive impact on anxiety, depression, mood, positive wellbeing, general health, self-control and vitality of prisoners	*Sudarsan Kriya* yoga can be a supplementary treatment option in patients suffering from non-psychotic and psychiatric disorders

3.5 Scientific Literature review of Yoga based intervention and Sleep [Table 5]

S/ No	Citation	Sample Size	Design/Duration	Outcome measure/ Variable study	Result	Summary
1	(Rao et al., 2017)	91 patients breast cancer (Yoga 45, control 46)	Two arm prospective Randomized control trial (12 weeks)	i, Pittsburgh Insomnia Rating Scale	Yoga-based stress reduction program, education with supportive therapy sessions showed significant decrease in sleep distress and improve quality of sleep in breast cancer patients	Yoga intervention had a good impact in sleep with advanced breast cancer patients
2	(Fang & Li, 2015)	120 nurses	Randomized control trial 6 months	i, Randomized control trial 6 months	Staff nurses in yoga group had better sleep quality and lower work stress compared with non-yoga group	Yoga can be the alternative solution to improve sleep quality and reduce work stress in staff nurses
3	(Fucito et al., 2015)	304 patience	Correlative study (8 weeks)	i, Athens Insomnia Scale ii, The University of Arkansas Substance Abuse Outcomes Module iii, The Fagerstrom Test for Nicotine Dependence iv, Short Inventory of Problems v, General Health Survey vi, The Time-Line Follow-Back interview	Sleep impairment and insomnia relates with drinking habits and are at risk of abusing more alcohol	Alcohol had negative effect on sleep latency, continuity, and quality of life
4	(Putnins et al.,	60 out	Randomized	i, Pittsburgh Sleep Quality	Insomnia had worse	Impaired sleep is a predictive

	2012)	patience	control design (12 weeks)	Index ii, Structured Clinical Interview for DSM-IV Axis I Disorders	outcomes in patients with bipolar and substance abuse disorder	factor for negative mood outcome
5	(Wong et al., 2010)	386 (292 boys/94 girls)	Comparative study	i, Childhood sleep problems ii, Substance (alcohol and drug) outcomes in young adulthood	Adolescence who were fatigue in childhood have poor response in sleep and drug outcomes	Preventive programs improve sleep and response inhibition problem in substance abusers
6	(Stevens et al., 2007)	20 adolescents	Analytical study 12 months follow up	i, Global Appraisal of Individual Needs ii, Trauma Severity Index iii, Substance Problem Index iv, Substance Frequency Index	Substance abusers treated with integrative behavioral sleep intervention had improved sleep quality and traumatic stress symptoms	Integrated approach of behavior therapy had improved sleep quality and reduce stress problem
7	(Burke et al., 2008)	113 patients	Longitudinal study	i, Addiction Severity Index ii, Medical Outcome Study iii, Sleep Questionnaire iv, Epworth Sleepiness Scale v, Functional Outcome Study Questionnaire	Opioid-dependent had sleep problems which was directly related with psychiatric stress	Sleep problem had hostile impact on substance abuse treatment
8	(Cousins, Bootzin, Stevens, Ruiz, & Haynes, 2007)	34 adolescents (17 boys,17 girls)	Analytical study	i, The GAINs Substance Problem Index ii, Global Appraisal of Individual Needs iii, The Gain's Parental	Lower level of parental involvement showed higher and reverse control in sleep disturbances, psychological distress and	Family member and home environment played an important role in sleep disturbances, psychological distress and recovery from

				Activity Index iv, The Gain's General Mental Distress Index v, The Gain's Substance Frequency Index vi, The Gain's Substance Problem Index	recovery	drug & illicit use and abuse
9	(Casden, 2005)	48 (22 yoga,26 wait list control)	Comparative study 6-week	i, Autonomic functions ii, Respiratory parameters iii, Cognitive functions iv, Psychological symptoms v, Physical symptoms	*Astanga* yoga on autonomic homeostasis, and respiratory function had significant improvement	*Astanga* yoga had significant improvement in breathing, positive mood, energy, quality of life, sleep, concentration, and short term memory
10	(Khalsa, 2004)	20 subjects	Clinical trial study (8-week intervention)	i, Total Walk Time ii, Total Sleep Time iii, Sleep Efficacy iv, Sleep Quality v, Sleep Onset Latency	Yoga can be the major tools to reduce chronic insomnia, sleep onset and sleep maintenance on insomnia disorder patients	Yoga intervention should be the main alternative treatment module for sleep and insomnia disorder patients
11	(Sulekha, Thennarasu, Vedamurthachar, Raju, & Kutty, 2006)	67 males	Match pair Two group Pre-post design	i, Polysomnographic recordings	*Sudarshana Kriyas* & *Vipassana* showed positive result in sleep disorder and helped to slow down sleep waves & reduce REM sleep state	*Sudarshana Kriyas* and *Vipasana* played a beneficial role in sleep-wakefulness behavior
12	(Patra & Telles, 2009)	30 male participants	Self as control design	i, Whole-night polysomnographic measures ii, Self-rating of sleep	Slow sleep waves and non-rapid-eye-movement were significantly higher in CM than supine rest	CM improved objective & subjective sleep quality
13	(Al-Zahrani &	30 patience	Cross-sectional	i, Insomnia Severity Index	Drug abusers are more	Sleep disorder was a major

	Elsayed, 2009)		study	ii, Pittsburgh Sleep Quality Index iii, Berlin Questionnaire for sleep apnea and restless legs	likely to have sleep disorder than ordinary people	comorbid disorder to cause the relapse
14	(Patra & Telles, 2010)	30 males	Self as control design(CM & SR practice twice a day)	i, Heart Rate ii, EEG, EMG recordings	CM helps to decrease heart rate variability, lower lipid profile and improve parasympathetic dominance during sleep	Cyclic meditation had a good impact in sleep rather than supine rest

3.6 Scientific Literature review of Yoga based intervention on Anxiety and Depression [Table 6]

S/No	Citation	Sample Size	Design/Duration	Outcome measure Variable study	Result	Summary
1	(Helmes & Ward, 2017)	52 participants (18 males, 34 females)	Randomized control trials	i, Mini-Mental State Examination ii, Anxiety Sensitivity Index iii, Mindfulness Attention & Awareness Scale iv, WHO Quality of Life Scale v, Montgomery & Asberg Depression Rating Scale vi, Geriatric Anxiety Inventory	MBCT group showed significant improvement on all anxiety & depression measures	Mindfulness-based intervention can be an important alternative treatment module for anxiety and depression
2	(Koszycki et al., 2016)	39 persons	Randomized control trials (12 weeks)	i, Liebowitz Social Anxiety Scale ii, Clinical Global Impression	Mindfulness had a better improvement than wait list in social anxiety	Mindfulness based intervention is equivalent for treatment of anxiety &

				Severity Scale iii, Beck Depression Inventory-II iv, Social Adjustment Scale self-Report Version v, Self Compassion Scale Short Form vi, Five Facer Mindfulness Questionnaire	symptom severity, social adjustment, and enhanced the self-compassion	depression
3	(Zemestani & Ottaviani, 2016)	74 adults (MBRP 37, TAU 37)	Randomized control trials	i, The Beck Depression Inventory–II ii, The Beck Anxiety Inventory iii, Penn Alcohol Craving Scale	MBRP had significant decrease in depression, anxiety, and craving compared to TAU	MBRP may be the effective intervention for depression, and SUDs patients
4	(Asmaee Majid et al., 2012)	31patients(MBRS16, Control 15)	Randomized control trials(8 weeks)	i, The Beck Depression Inventory–II ii, The Beck Anxiety Inventory iii, Penn State Worries Questionnaires	MBSR showed significant reduction in anxiety, depression, worry symptoms & generalized anxiety symptoms	MBSR can be the acceptable intervention for generalized anxiety disorder symptoms
5	(Khalsa, Hickey-Schultz, Cohen, Steiner, & Cope, 2012)	121 students (51 females, 70 males)	Randomized control trials(11 weeks)	i, The Self-Report of Personality ii, The profile of Mood States iii, The Resilience Scale iv, The Perceived Stress Scale v, The Inventory of Positive Psychological Attitudes	Yoga and physical education showed a significant improvement in anxiety	Yoga intervention is acceptable in school and plays a protective & preventive role in preserving mental health
6	(Becker &	Subjects –	Cross sectional	i, Substance abuse scale	Depression and substance	Depression and substance

	Curry, 2007)	106	Design	Depression severity ii, Dimensional ratings of illness severity based on adolescent interviews iii, Parent ratings of adolescent behavior	abuse had a negative interactive effect on youth in social capability, and severity was high in depression	abuse had significant impairment in social competence
7	(Sharma, Yadava, & Hooda, 2005)	33 students(10-day yoga workshop)	Single group repeated measure design	i, Anxiety ii, Concentration iii, Physical parameter	Yoga helped to reduce anxiety, lowering excitability, increasing concentration, and self-control	Yoga is a combination of stimulation, relaxation, and meditation technique that is directly proportion with the physical, mental, and spiritual well-being
8	(Berndt et al., 2013)	Subjects–244 patients	Correlative study	i, Self-efficacy for smoking cessation ii, Anxiety and depression scale	Intervention of anxiety and self-efficacy would reduce craving of smoking and substance abuse	Self- efficacy intervention plays vital role in smoking abstinence
9	(Woolery et al., 2004)	28 subjects	Randomized control trials	i, Beck Depression Inventory ii, State-Trait Anxiety Inventory iii, Profile of Mood States	*Iyengar* yoga intervention showed a good impact on decreasing self-report, depression symptoms, and trait anxiety	*Iyengar* yoga supports to decrease negative mood and fatigue
10	(Lakkireddy et al., 2013)	Subjects - 36	Single-center, pre-post study	i, Atrial fibrillation Burden ii, Quality of life iii, Depression and anxiety scores	Yoga practice decreases atrial fibrillation and reduce heart rate variability	Yoga practice reduces systolic and diastolic blood pressure, anxiety & depression scores and improve quality of life
11	(Vedamurthachar et al., 2006)	Subjects - 60 (30 experimenta	Randomized control trial with two group	i, Beck Depression Inventory ii, Morning plasma cortisol ACTH, and prolactin too were	*Sudarshana Kriya* helped to reduce stress hormone levels along with	*Sudarshana Kriya* yoga showed good impact in depressive alcohol

		l, 30 control)		measured	depression	dependent subjects
12	(Nuttbrock et al., 2014)	Subjects– 230 Transgender women (six months)	Prospective study	i, Depression scale	Depressive symptoms in transgender women was strong risk factor of substance abuse	Complimentary therapy can play vital role to reduce depressive symptoms in transgender women

3.7 Scientific Literature review of Yoga based intervention on Response inhibition [Table 7]

S/no	Citation	Sample Size	Design/Duration	Variable study	Result	Summary
1	(Purohit & Pradhan, 2016)	72 (yoga - 40,32 wait list control)	Randomized controlled trail (3 months yoga)	i, Trial Making Test ii, Stroop Color-Word Task iii, Digits Span Test iv, Digit Symbol Substitution Test	Yoga programme on orphan adolescents showed improvement in executive function & had significant progress in Stroop color-word task	Yoga programme on orphan adolescents improved cognitive functions
2	(Telles, Singh, Bhardwaj, Kumar, & Balkrishna, 2013)	98 children	Randomized controlled trial	i, Euro fit, physical fitness test battery ii, Stroop color-word task for children iii, Battle's self-esteem inventory	Yoga and physical exercise has shown better result in Stroop color-word naming test scores	Yoga and physical exercise can improve fitness, cognitive appearances and self-esteem in school children
3	(Mitchell et al., 2013)	16 cocaine depended	Comparatively two group study	i, Stroop task	Cocaine use had relatively good performance in fMRI stroop intrinsically rather than healthy subjects	Cocaine addicts showed positive impact on midbrain & basal ganglia
4	(Hariprasad, Koparde, et al., 2013)	87 (yoga 44, waitlist 43)	Randomized Single-blind controlled study (6 months)	i, Rey's Auditory Verbal Learning Test ii, Rey's complex figure test iii, Wechsler's Memory Scale iv, Digit and spatial span	Yoga based interventions have a positive result in Stroop color-word task score	Yoga based intervention improves cognitive function in elderly living in residential care homes

				v, Controlled Oral Word Association test vi, Stroop Color Word Interference Test vii, Trail Making Test A and B		
5	(Froeliger et al., 2012)	14 hatha yoga practitioners	2 group Correlative study (Mindfulness 7 days Hatha yoga 45-min a day	i, Center for Epidemiological Studies-Depression scale ii, Beck Anxiety Inventory iii, Positive and negative affect schedule iv, The Affective Stroop Task	*Hatha* yoga practitioners showed better score in neurocognition, emotion and activation in the ventrolateral prefrontal cortex during Stroop trials task	*Hatha* yoga practitioners have shown reactivity to negative emotional stimuli and improve cognitive functions
6	(Dixit et al., 2012)	30 males	Single group pre & post design	i, Stroop color-word task	Caffeine had positive result in processing information & Stroop color word task score	Caffeine had reduction in Stroop interference & increase facilitation
7	(Silveri et al., 2011)	32 adolescents	Comparatively study	i, Stroop Color Naming ii, Word Reading, and Interference	Children and adolescents with positive family alcoholism history had brain functional activity affected and showed negative performance in stroop color naming	Influence on family alcoholism had positive effect on brain activation during the response inhibition task
8	(Al-Zahrani & Elsayed, 2009)	254 patients (100 control group with the healthy subject)	Two groups, comparative study	i, Benton visual retention tests ii, Color trail making test iii, Stroop colors-word test iv, Symbol digit modalities	Drug addiction had impaired cognitive control and Stroop color-word task score was less during behaviour disturbances	Specific brain region controls cognitive function which is impaired in drug addiction patients

				test v, The 5 dots cognitive flexibility test vi, Tam verbal flexibility test	and hospitalization	
9	(Streeter et al., 2008)	74 (Cocaine treatment trail)	Correlation study	i, Stroop task subscale scores ii, Hamilton depression rating scale	Cocaine dependent has more chance to dropout from treatment session & barrier to recovery	Stroop color-word task is used to recognize the risk in cocaine dependence subjects
10	(Kulaif & Valle, 2008)	60 (30-illiterate,30-basic education	Correlation study	i, Stroop Color-Word Test ii, Colored Numbers Test	Educated subjects performed better then illiterate in Stroop color-word test	Colored Numbers Test is used to evaluate selective attention
11	(Oken et al., 2006)	135 (men &women	Randomized, controlled trial (6 months, yoga, walking, wait-list)	i, Stroop Color-Word Test ii, Electroencephalogram iii, Quality of life iv, Profile of Mood States v, Multi-Dimensional Fatigue Inventory	Yoga intervention had good impact on stroop color word task, quality of life, physical activity, fatigue and sense of well being	Yoga group showed significant improvement in quality-of-life and physical measures compared to exercise and wait-list control groups
12	(Houx, Jolles, & Vreeling, 1993)	247 volunteers	Cross-section design	i, Stroop Color-Word Test	Ageing hampers biological life, environmental factors & brain function which leads to poor performance in Stroop color-word task	Education & ageing had a significant role on cognitive performance

3.8 Scientific Literature review of Yoga on Attention task
[Table 8]

S/no	Citation	Sample Size	Design/Duration	Variable study	Result	Summary
1	(Mishra et al., 2016)	24 (14 boys,10 girls)	Comparative study	i, Digit–Letter Substitution Test ii, Six Letter Cancellation Test	Yoga increased attention, visual search and mental speed in adolescents	Yoga helps to improve selective attention
2	(Pradhan, 2013)	36 (21male,15 female)	Self as control design (3 month yoga)	i, Digit–Letter Substitution Test ii, Six Letter Cancellation Test	*Kapalbhati* practice had no impact on attention and concentration	*Kapalbhati* had no effect on cognitive function
3	(Pradhan & Nagendra, 2010)	57 males	Self as control design	i Wechsler memory scale ii, Digit span forward and backward iii, Spielberger's State-Trait Anxiety Inventory	State anxiety score was significantly decreased on CM rather than supine rest and memory score was increased immediately after CM	CM had a positive impact on memory and state anxiety
4	(Kumar & Telles, 2009)	35 males	Comparative study with control group	i, Six Letter Cancellation Test	Meditation *Dharana* or focusing on symbol "*OM*" had a good result on six letter cancellation tests	*Dharana* "*OM* " had significant result on cognitive function rather than *Cancalata* session
5	(Chattha et al., 2008)	108(premenopausal women)	Randomized control study	i, Six-letter cancellation test ii, Punit Govil Intelligence Memory Scale	"IAYT" showed positive improvement in verbal retention, memory and cognitive function	"IAYT" showed improvement on hot flushes, night sweats, mental problem & selective attention
6	(Sarang &	69 males	Self as control	i, Six-letter cancellation test	CM had good result in	After CM wrong

	Telles, 2007)		design		motor response, visual capacity, selective attention and it leads to increase SLCT score	cancellation score was reduced

3.9 Scientific Literature review of Yoga based intervention on Memory
[Table 9]

S/no	Citation	Sample Size	Design/Duration	Variable study	Result	Summary
1	(Purohit & Pradhan, 2016)	72(40-yoga,32-wait-list control)	RCT design (3 months)	i, Trail making test ii, Digit span test iii, Digit symbol substitution test iv, Stroop color-word task	Yoga intervention showed improvement in digit span test and stroop color word task in young orphans	Yoga program was significant in young orphan to improve their executive functions
2	(Hariprasad, Koparde, et al., 2013)	87 (yoga 44,wait-list 43)	Randomized Single-blind controlled study (6 months)	i, Rey's Auditory Verbal Learning Test ii, Rey's complex figure test iii, Wechsler's Memory Scale iv, Digit and spatial span v, Controlled Oral Word Association test vi, Stroop Color Word Interference Test vii, Trail Making Test A and B	Yoga based intervention have positive result in digit span score	Yoga based interventions have positive result on working memory in elderly living in residential care homes
3	(Prakash et al., 2010)	15 practitioners of Vihangam	Two group correlative study	i, Stroop test ii, Trail-Making, iii, Digit Symbol Substitution	*Vihangam* yoga had significant increase in cognitive tools rather than	*Vihangam* yoga meditation helps to improve selective

		yoga		tests iv, Digit span tests	the control group	attention and memory
4	(Pradhan & Nagendra, 2010)	57 males	Self as control design	i, Wechsler memory scale ii, Digit span forward and backward iii, Spielberger's State-Trait Anxiety Inventory	State anxiety score was significantly decreased in CM than supine rest & digit spam score was increased immediately after CM	CM had positive impact on immediate memory span and state anxiety
5	(Subramanya & Telles, 2009)	57 males	Self as control design	i, Wechsler memory scale ii, Digit span forward and backward iii, Spielberger's State-Trait Anxiety Inventory	CM had a better result in attention, concentration, immediate memory and reduced state anxiety than *savasana*	CM had a positive impact rather than *savasana* on immediate memory span and state anxiety
6	(Dolan et al., 2008)	38 substance dependence inpatients	Comparative study	i, Wisconsin Card Sorting Test ii, Trail-Making Test iii, Stroop Color Word Test iv, The Wais-II Digit Span v, The Iowa Gambling Task	Family history with substance abuse have poor performance in digit span scores, executive and functional cognitive tools	Family history with substance abuse showed as increase risk factor for cognitive impairment in substance dependence inpatients
7	(Sharma, Das, Mondal, Goswami, & Gandhi, 2006)	30 patients with major depression	Randomized control trial design (8 weeks)	i, Letter cancellation test ii, Trail making test 'A' iii, Trail making test 'B' iv, Ruff figural fluency test v, Forward digit span vi, Reverse digit span test	*Sahaj* yoga improves executive function, anxiety, depression, immediate memory and attention span	*Sahaj* yoga showed better improvement in cognitive functions
8	(Casden, 2005)	48 (22 yoga, 26 wait-list)	Randomized control trial design	i, Breathe holding time, abdominal style breathing, positive mood, fatigue, energy, quality of life ii, Digit Span subtest iii, Trail Making Test	*Ashtanga* yoga practice showed positive result in mood, fatigue, positive energy, quality of life, sleep concentration and immediate memory	*Ashtanga* yoga practice had good impact on insomnia and immediate memory

3.10 Scientific Literature review of Yoga on Dexterity
[Table 10]

S/NO	Citation	Sample size	Design/Duration	Variables	Result	Summary
1	(Nitin Gosewade,Vinod Shinde,& Chhaya, 2015)	60 healthy adults	Pre–post with control design (8 weeks)	i, Finger dexterity test	*Kapalbhati* and eye exercise showed significant result in motor skills, finger dexterity task time & hand to eye coordination	*Kapalbhati* and eye exercise showed good impact on balance and co-ordination
2	(Asakawa & Sugimura, 2014)	33 children	Longitudinal study design	i, Finger dexterity	Performance on additional tests in children was strongly supported by their finger dexterity	Calculation skills in children was associated with finger dexterity
3	(Telles, Balkrishna, & Singh, 2012)	140 subjects	Correlative study between two groups	i, O'Connor finger dexterity task ii, Shape and size discrimination task	*Kapalbhati* and breath awareness showed significant improvement in fine motor skills, visual discrimination and reducing error in finger dexterity task score	*Kapalbhati* showed improvement on finger dexterity task than breath awareness
4	(Subramanya et al., 2009)	108 (60 boys, & 48 girls)	Pre–post design (10 days)	i, O' Connor tweezers dexterity ii, Minnesota manual dexterity apparatus	After 10 days of yoga intervention children showed significant decrease in manual and task tweezers dexterity scores	Yoga intervention in children helps to improve balance and co-ordination

5	(Kornatz, 2005)	10 adults	Pre–post design (2 weeks)	i, Index finger acceleration ii, Manual dexterity	Finger task and steadiness improving intervention was very useful to reduce the rate of variation of motor function output, hand muscle and manual dexterity	Regular practice of finger movement helped to improve motor function
6	(Manjunath & Telles, 1999)	80 subjects	Pre-post study	i, Tweezers dexterity	Yoga intervention significantly increase tweezers to place metal pins in spaced holes	Yoga practice would be preferred for improvement of motor function

3.11 Scientific Literature review of Yoga on Finger tapping task [Table 11]

S/ no	Citation	Sample Size	Design/Duration	Variable study	Result	Summary
1	(Wylie, Tanabe, Martin, Wongngamnit, & Tregellas, 2013)	19 healthy subjects	Single-blind, crossover design	i, Finger-tapping test	Healthy subjects with nicotine treatment improved neuronal response in the cerebellar vermis compared to placebo	Nicotine treatment helps improve co-ordination and reduce fatigue
2	(Da Silva et al., 2012)	1169 patients, 689 healthy controls	Comparative study with control group	i, Finger-tapping test	Index finger taping measured motor speed and procedural learning in schizophrenia patients	Finger tapping can be used to test motor speed, routine and technical learning in schizophrenia patients

3	(Aoki & Fukuoka, 2010)	28 (14 elderly, 14 young adults)	Comparative study	i, Finger-tapping test	Young adult significantly perform finger taping test rather than an elderly adult	Age was the main factor of slowness on motor function
4	(Dash & Telles, 1999)	243 (53 adults,152 children (38 adult control	Pre–post with control design (30 days yoga	i, Finger-tapping test	Yoga intervention in youth & children had significant result in motor speed	Motor speed reduces after successive repetitive sessions
5	(Ruff & Parker, 1993)	360 normal volunteers	Stratified design	i, Finger Tapping ii, Grooved Pegboard Tests	Finger taping test had significant gender differences, as women were slower than an older age group	Young and good educated subjects have better motor function
6	(Chavez et al., 1983)	56 (28 males, 28 female	Comparative study	i, Finger Tapping, ii, Trial Making (A & B) iii, Digit Span iv, Digit Symbol tests	Neuropsychological and finger tapping test scores are affected directly by anxiety and gender	Men performance was better than females on finger tapping and motor function
7	(Rabinowitz & Lavner, 2014)	170 (83 men, 87 women)	Correlative study between two groups	i, Mini-Mental State Examination, ii, Forward digit span test iii, Finger tapping	Mild cognitive impairment or dementia significantly increases the length and variability of the finger touch compared with non-cognitive impairment	Finger tapping showed better sensitivity to compare cognitive functions among dementia and non-cognitive impairment individuals

3.12 Scientific Literature review of Yoga and Mirror-tracing task [Table 12]

S/no	Citation	Sample Size	Design	Variable study	Result	Summary
1	(Hagins et al., 2013)	30 (17 males,13 females)	Comparative study	i, Mental arithmetic ii, Mirror tracking iii, (BP, HR)	Yoga intervention compared to physical education had similar improvement in children to cope with psychological stress, physiological response and behavioral stressors	Yoga and physical exercise showed no difference on stress reactivity
2	(Telles, Praghuraj, Ghosh, & Nagendra, 2006)	52 (26 yoga,26 controls)	Pre–post with control design	i, Mirror tracking task	Yoga intervention showed progress on reversal ability, eye-hand coordination, speed, accuracy, and better performance on mirror tracking scores	Yoga showed better results on a mirror tracking task and motor function