

Chapter 2

Review of Literature

An exploration of past literature was carried out to understand the advances in the field of addiction, to explore the gaps present in research and to enhance the research methodology. A summary of the reviewed literature is as follows:

Prevalence of Alcohol Use Disorder

A research studying the course and pattern of alcohol use in Kolkata, India was conducted by Ghosh et al. (2012). The study assessed the drinking behaviour of 228 males above the age of 18 using the AUDIT developed by the WHO (2014). Results showed that 150 out of the 228 participants had the habit of abusing alcohol, with 78% of them as non-harmful drinkers, 14% as dependent users and 8% as hazardous drinkers. The mean age of the first drink was reported to be 20.8 years and a majority of users (84%) showed a lack of understanding of the hazardous effects of alcohol overuse. 41% of users had stated that they had the habit of drinking in public places or at their work place and 38% reported to buy liquor from illicit sources, thereby showing the pattern of alcohol use and movement.

Another study (Nadkarni et al., 2013) conducted in Goa, India involved a four-year follow up of 150 participants, comprising of 50 regular users (score >8 on AUDIT and hence diagnosed with AUD), 50 casual users (score <8 on AUDIT) and 50 abstainers (not consumed alcohol in the past year) to observe the course of alcohol consumption. Data was collected using a structured questionnaire developed by the researchers. There was an overall 16.7% rate of attrition. Among the abstainers and casual drinkers, 12.8% progressed to satisfy criteria for AUD at the end of the four year period whereas 53.9% of the regular users showed persistent diagnosis of the condition. The regular users group qualified for higher levels of anxiety and depression, a lower Body Mass Index and a higher risk of hypertension compared to the other groups.

A study exploring the prevalence of AUD in Pondicherry involved a cross-sectional testing of 850 households to assess individuals using the AUDIT. Aimed at assessing the prevalence of AUD, the study concluded that 9.7% men above the age of 18 and 17.1% men between the ages of 46-55 were found to abuse alcohol, out of which 42.1% were identified to be

under addictive use. Higher prevalence of AUD was observed in people who were low on their education and exposure (illiterate or primary education), those exposed to alcohol before the age of 20 and those in the lower socio-economic status who consumed alcohol to overcome body pain. About one-fifth of the individuals consuming alcohol were found to have health issues, most commonly diabetes mellitus and hypertension (Ramanan & Singh, 2016).

A similar study (Manimunda et al., 2017) was conducted to assess the prevalence of AUD in Andaman and Nicobar, where 18,018 individuals aged 14 years and above were tested using a modified version of the Gender, Alcohol and Culture: An International Study and the AUDIT. The results showed that 35% of males above the age of 14 and 6% of females were regular consumers of alcohol. It was also reported that about 20% showed hazardous drinking patterns and 23% were dependent on the substance. The habit of occasional heavy drinking was reported by 18% males and 12% females. The study concluded that it is necessary to devise effective treatment strategies to treat people with AUD, with one in every ten persons in Andaman and Nicobar needing treatment for the condition.

A retrospective observational study was conducted by Timungpi et al. (2019), where the medical records of patients diagnosed with AUD between the time periods of 2007-11 (group A) and 2012-16 (group B) were studied. Group A consisted of 1046 patients whereas group B consisted of 2618 patients, showing that the incidence of the condition doubled within the four-year period. A semi-structured interview was conducted to determine the socio-demographic correlates of the addictive behaviour among select participants. The results stated that the minimal age of exposure to alcohol was eight years and that 69.3% of those addicted to alcohol were below 40 years of age. It was also reported that more than 80% of the patients developed addiction to tobacco or cannabis in due course, with an increase in comorbid drug use from 17.39% in group A to 31.4% in group B. The researchers insisted upon the need for control through legislation in the availability of different substances and creation of awareness through early education, screening and intervention.

Neurobiology of Addiction

Koob (2006) in his review of the neurobiology of addiction has stated that brain chemistry plays an important role in how 'drug taking' becomes 'drug addiction'. It was also stated that the involved brain regions were found to change respectively with changes in the addictive behaviour. The mesolimbic reward system comprising of the mesolimbic dopamine track, ventral tegmental area and basal forebrain were indicated to play a significant role in the development of the reinforcing properties of addiction. The extended amygdala inclusive of the bed nucleus of the stria terminalis, central nucleus of the amygdala and shell of the nucleus accumbens were found to strengthen the reward mechanisms. Changes in the neurotransmitters dopamine, opioid peptide, Gamma amino butyric acid (GABA) and endocannabinoid were identified to be responsible for the acute reinforcing effect of the drugs. When a person withdraws from drug consumption, the above brain regions and neurotransmitters were found to be negatively reinforced, hence reflected through withdrawal symptoms.

A study by Baler and Volkow (2006) explored the changes that surface in the brain due to prolonged use of alcohol and how these changes maintain the loop of addiction. The findings of the study showed that the pleasure attained due to the consumption of alcohol was due to the activation of the dopamine pathways, causing upsurge of dopamine in the limbic region, leading to neuroplastic changes. The changes in these circuits were found to impact the reward mechanism, motivation or drive to consume alcohol, salience attribution, inhibition control and memory consolidation. It was hence seen that the changes in the dopaminergic pathways not only reinforced the pleasure of drinking but also inhibited self-control, causing the individual to lose control over the drinking behaviour, in addition to other cognitive deficits encountered.

A review summarizing the neurobiology of AUD was presented by Banerjee (2014a). It was stated that four neurotransmitters dopamine, serotonin, GABA and glutamate changes were observed in people with AUD. Alcohol was reported to have a depressing effect on the brain, making individuals under its influence to involve in activities that would otherwise be inhibited. It was said to reduce activity in the hippocampus thus causing memory impairments. When taken in heavy doses, alcohol was found to cause a reduction in coordination and judging abilities. Neuro-adaptation of the brain to the presence of the substance was stated to be the cause of addiction.

Tomkins & Sellers (2001) explored the role of different neurotransmitters in the incidence of addiction to alcohol. The study reviewed different researches that explored the role of neurotransmitters in the causation and maintenance of addiction to alcohol. It was found that dopaminergic, serotonergic, GABA and the glutamate pathways showed involvement in the addictive behaviour. Though there was involvement of all the four pathways in the incidence of AUD, a single allele could not be identified as the causation. It was found that different alleles represented themselves to be the causation in different conditions, hence requiring more research directed at identifying the causal relationship between neurotransmitters and addiction to alcohol.

Age and Alcohol Use Disorder

A study by Manjunatha et al. (2008) explored the time gap between the different significant stages in the development of AUD among 81 males with a mean age of 35.16 years. The development of each criterion stated by the ICD was considered a milestone in the development of the condition. The drinking pattern of the subjects and information regarding the fulfillment of the criteria for diagnosis of the condition were collected through a structured interview after detoxification, using the Semi-Structured Assessment for the Genetics of Alcoholism- II. Craving, tolerance and loss of control over the drinking behaviour were reported to be the chronological order in which the criterion were met by majority of the subjects. The results stated that the subjects took an average of 3.2 years to meet the complete criteria of AUD from the time of meeting the first criteria and an average of 5.6 years to complete the diagnosis from the age of onset of the drinking behaviour. The researchers suggested that awareness of the time gaps will help in the prevention and management of the condition.

A research investigation conducted by Soundararajan et al. (2017b) aimed at understanding the relationship between age of onset of alcohol consumption to the likelihood of development of AUD as an adult. The study assessed 99 participants (91 males and 8 females) between 28-45 years of age using the Quantity-Frequency for Alcohol Questionnaire developed by the National Institute of Alcohol Abuse and Alcoholism. The mean age of first-use was found to be 21.14 years and there was a negative correlation between the age of onset, frequency and quantity of drinking. It was hence concluded that, earlier the age of onset, higher the risk of hazardous drinking. The researchers have suggested that restricting early onset through strict

legal mandates and the development of treatment strategies respective to the age of onset will be effective.

A study by Carmichael et al. (2019) was aimed at classifying drinking behaviour into different types based on the nature of perceived outcomes and the age of use. The study analysed secondary data obtained through the National Epidemiological Survey on Alcohol and Related Conditions. A total of 5402 individuals between the ages of 18-64 years, diagnosed with AUD in the last one year period before the conduction of the study were included as the sample. Latent Class Analysis was employed at identifying the sub-groups of the sample. Five different categories of users were identified based on the pattern of drinking and they were studied across time to understand the age of prevalence. The groups identified were ‘Adverse effects only’, ‘Low perceived life interference’ and ‘Highly problematic’ prevalent in younger adults whereas older adults showed ‘Difficulty cutting down’ and ‘Alcohol-induced injury’. The study recommended for considering the differences in the nature of the drinking behaviour across age when studying the condition of AUD.

Alcohol Addiction and Women

Malik et al. (2017a) explored the incidence, severity, comorbidity of AUD among Women and the temporal relationship to alcohol consumption. The sample included 35 women of the mean age of 38.51 years, who were assessed using the clinical Data Sheet, Mini International Neuropsychiatric Interview (MINI), Structured Clinical Interview for DSM-IV Personality Disorders, Addiction Severity Index, Alcohol Subscale and Fagerstrom Test for Nicotine Dependence. The study stated that the mean age of exposure to drinking and smoking was in the early twenties and that of diagnosis of addiction was 29.66 years. The results indicated a high level of dependence on alcohol and a moderate level of dependence on nicotine. Co-morbidity of other psychiatric disorders was also explored, showing 57.14% co-morbidity with mood disorders and 17% with personality disorders, thus proving the high risk of AUD and other comorbid conditions in women.

Another study by the same group of researchers aimed at exploring the beliefs and attitudes of people towards drinking behaviour in women, so as to understand the availability of social support and possibility of social integration for women recovering from AUD. The

researchers recruited 60 women above the age of 18 using the snowball sampling technique. The selected sample were assessed upon the Kessler Psychological Distress Scale, the Alcohol, Smoking and Substance Involvement Screening Test and a semi-structured interview Schedule assessing the participants awareness related to alcohol use in women, beliefs related to risk and protective factors against alcohol abuse among women and the need for treatment of the condition. The sample reported mild levels of stigmatization towards women diagnosed with AUD, had awareness of the risk factors and supported the need for treatment, indicating social acceptance of women recovering from AUD (Malik et al., 2017b).

The same researchers conducted another study comparing the stressful and traumatic experiences of women with and without AUD in India. The ‘with AUD’ group comprised of 35 participants and the ‘without AUD’ group comprised of 60 participants, assessed using the Life Stressor Checklist- Revised. The group of women ‘with AUD’ reported to have experienced a higher frequency of stressful events when compared to the ‘without AUD’ group. Women with AUD had undergone childhood abuse and interpersonal trauma across the lifespan, hence drawing a parallel between the experience of life stressors and alcohol abuse. The relationship between the two factors was bidirectional, stating that the experience of stress led to alcohol use and vice versa. The findings of the study reiterated the need for intervention strategies designed especially for women, taking into account the gender-specific factors (Malik et al., 2017c).

Narayanan (2017) explored the personality traits of a 54-year old woman addicted to alcohol from Bangalore, India, using the case study approach. The researcher made a comparison between the self-reported and informant-reported traits of the woman, assessed using the MINI, AUDIT and the NEO-PI-R. The results showed that there were wide differences in the self-perception of the sample towards her personality traits and the perception held by the informant. The woman showed high scores on Neuroticism and low scores on Agreeableness on the NEO-PI-R. The researchers suggested the need for exploring the personality dimensions of women with AUD in India, which would help in developing gender-specific treatment strategies.

Alcohol and Psychiatric Comorbidity

A research by Murthy et al. (2007) explored the history of seizures in 381 male in-patients with alcohol dependence at the National Institute of Mental health and Neurosciences,

Bangalore, India. A lifetime history of seizure attacks was collected from the patients and the informants. Those with a history of seizures were subjected to Electro-Encephalography (EEG) and Cranial Computer Tomography (CCT) scan. The results revealed that 16% of the studied sample showed a definite history of seizures and 25% showed a family history. Among those with a history of seizures, 43% reported a temporal connection between the seizure attack and the drinking behaviour and 28.3% developed seizures as a withdrawal symptom. The CT scan revealed that 73% of subjects with a history of seizures showed cortical atrophy and 9% showed focal abnormality. The researchers suggested that there is a clear indication of the relationship between alcohol use and the incidence of seizure attacks, which has to be taken into consideration when devising management strategies.

A study by Arackal and Benegal (2007) explored the prevalence of sexual dysfunction in men with AUD. The study explored sexual dysfunction in 100 males diagnosed with AUD, using a sexual dysfunction checklist constructed based on the diagnostic criteria for research stated by the ICD-10. The results showed that 72% of the studied population showed the prevalence of one or two disorders of sexual dysfunction, the most common being premature ejaculation, low sexual desire and erectile dysfunction. The researchers concluded that sexual dysfunction occurs frequently in people with AUD and suggested the need for including screening for sexual dysfunction as part of the diagnostic procedure so as to make management inclusive of the condition.

A review conducted by Singh and Balhara (2016) was aimed at understanding the psychiatric co morbidity of AUD. Evidence showed increased rates of co morbidity of mood disorders, anxiety disorders and sexual dysfunction with AUD, the course being similar and hence considered to be co-prevalent. Few studies had shown evidence for the presence of Attention Deficit Hyperactivity Disorder and other psychotic conditions, especially alcoholic hallucinosis. Presence of dual and multiple co morbidity was also reported. Stress and cognitive impairment were also reported as the outcomes of alcohol abuse by all studies that were reviewed. Incidence of depression, anxiety, stress, Attention Deficit Hyperactivity Disorder (ADHD) and Attention Deficit Disorder (ADD) show vulnerability to the development of AUD.

Another review article by Balhara et al. (2017) summarized the relationship between Depression and AUD. It was reported that the conditions were found to be frequently co-

occurring and that the disorders also augmented the incidence of each other. Sex workers, individuals involved in extra-marital affairs and those undergoing pressure at the workplace were identified to be at high-risk for co-occurrence of the disorders. It was also stated that co morbidity of depression and AUD increased the risk of suicidal ideation and attempts.

Desai et al. (2017) studied the co morbidity of Alcohol Dependence Syndrome (ADS) and ADHD. In order to fulfill the objectives of the study, 35 patients diagnosed with ADS according to the criteria of ICD-10 were chosen for the study, along with 369 first degree relatives of the patients. Data was collected using the Schedule for Clinical Assessment in Neuropsychiatry, Severity of Alcohol Dependence Data Questionnaire, Family Interview for Genetic Studies, ADHD checklist and Parents Rating Scale using which, patients presently diagnosed with ADS and their first degree relatives were retrospectively studied for understanding the incidence of ADHD in the early years. The results indicated that presence of residual ADHD features which led to 16 times greater risk for developing early-onset ADS. The researchers suggested that presence of ADHD symptoms in childhood can thus be considered as a predictive factor towards the development of ADS in later life.

A study on similar lines by Ganesh et al. (2017) was aimed at exploring the incidence of ADHD, Conduct Disorder and Oppositional Defiant Disorder occurring earlier in life to be considered as early markers of the incidence of SUD later in life. They used the Adult ADHD Self-Report Scale Symptom Checklist in assessing the ADHD symptoms of 240 patients with SUD, comparing between early onset and late onset SUD. The findings of the study showed that 56.25% of adults with SUD showed 'likely' symptoms of ADHD and 21.7% of them showed 'highly likely' symptoms of ADHD. The researchers hence concluded that presence of ADHD and other childhood psychiatric disorders may be considered as early markers for the development of SUD later in life and that conducting regular screening for the vulnerable group can help in early identification and treatment of the condition.

A research study was carried out to understand AUD among 70 males and 50 females (of age 18-50 years) diagnosed with the condition at Tumkur, India. The Severity of Alcohol Dependence Questionnaire (SADQ) and the MINI were used to collect the required information. The results of the study showed that females presented more psychiatric co morbidity than males, with depression and anxiety disorder the most commonly found. It was also reported that

eating disorders and other psychotic conditions were also present but with lesser frequency, whereas anti-social personality disorder was found only among males (Nagendrappa et al., 2018).

A recent study by Ravikanth & Sultan (2020) explored the co morbidity of psychiatric disorders in people with Alcohol Dependence Syndrome. Data was collected from 100 participants (males=65, females=35) between the ages of 30-55 years using the MINI two-weeks after detoxification. The results showed that 33.33% of participants had co-occurring mental health conditions in addition to Alcohol Dependence Syndrome. The most common co morbid disorders were mood and anxiety disorders. There were also rare cases of co morbid psychotic conditions. Co morbidity was found to be influenced by the severity of dependence and the duration of the drinking behaviour.

Factors Causing Alcohol Use Disorder

A study by Chandra et al. (2003) aimed at studying the relationship between the personality attribute of sensation seeking and high-risk sexual behaviour in heavy users of alcohol. The behaviour of 60 individuals, 30 diagnosed with AUD and 30 without AUD were assessed using the Sensation Seeking Scale in addition to a semi-structured questionnaire exploring their sexual behaviour. The results revealed that subjects with high-risk sexual behaviours showed high scores in all areas of sensation seeking with the dimension of disinhibition being highly associated with high-risk sexual behaviour. The researchers suggested that the treatment and management of alcohol should involve a detailed analysis of Personality and the incorporation of the necessary remediation.

A research conducted by Schmidt et al. (2007) aimed at assessing Anxiety Sensitivity (AS) as a predictor to alcohol abuse. Data was collected from 404 young adults using the AS Index to assess their proneness to getting anxious and were followed up for two years to study their behaviour of abusing alcohol. The results showed that presence of a high score on the assessment of AS has a positive correlation with the development of AUD. It was also noted that gender differences did not play a role in discriminating between the groups in the development of the condition. The researchers reported that the findings of the study assert the role of AS as a predictor of alcohol overuse.

Girish et al. (2010) explored the prevalence of alcohol use and the factors causing alcohol abuse in the Indian population. Door-to-door surveys were conducted and consumers of alcohol were recruited to collect the required data through a structured interview. Alcohol abuse was reported by 13% of the sample, with higher use in urban areas than rural areas and the age bracket of users being 26-45 years. According to the findings of the study, causes of drinking were reported as loneliness, habituation, peer pressure, pleasure seeking, familial and financial problems. Peer pressure and habituation were found to be factors which maintained the regular consumption of alcohol in spite of efforts to abstain.

A study by Chaudary et al. (2015) explored the drinking behaviour of medical college students where 192 undergraduate medical students were assessed on their drinking behaviour using the AUDIT. The results of the study showed that 87.3% were problem drinkers with 6.8% classified as hazardous, 2.3% harmful and 3.6% dependent users. The family history of the students was identified to be a major influencer of the drinking behaviour, with nuclear family type and the mother being employed as major predecessors to the drinking behaviour. The researchers observed that the parental behaviour and attitude towards alcohol use was a factor impacting the drinking behaviour of the children and suggested that family history be considered as a marker in the identification of AUD.

A study conducted by Rathod et al. (2015) in Madhya Pradesh, India explored the prevalence of AUD using the AUDIT and explored the personal, familial and societal factors that influenced the drinking behaviour through unstructured interview. The intensity of alcohol use increased respective to the mental state of the individual, family type being nuclear, high-quality housing, urban residence, physiological health conditions and smoking habits. Refraining from alcohol use was facilitated by financial security leading to higher self-worth, financial commitments and regular employment, hence acting as protective factors. It was found that only 2.8% of alcohol users sought treatment, showing that it is necessary to propagate and widen the treatment opportunities for the different addictive conditions.

A review by Esser and Jennigen (2018) aimed at consolidating the results of different research efforts upon the link between alcohol marketing and alcohol consumption. The reviewers have stated that in recent years there is an increase in the consumption of alcohol among youngsters, which in turn leads to a heightened rate of alcohol related health conditions

being encountered. In the low and middle income countries, it has been stated that an increase in the circulation of disposable income, i.e., an increase in the spending capacity relative to the earning capacity, has led to more money being spent on alcoholic beverages. Another factor perpetrating alcohol use is the lack of stringent regulations or guidelines regarding the manufacturing, import, export, sales and marketing of the substance. The reviewers suggest that development of policies providing directions towards alcohol marketing can play a significant role in the regulation of alcohol consumption.

An investigation by Gedam and Patil (2018) studied the relationship between personality traits and the severity of AUD. The study included 100 participants, assessed on the SADQ and the 16 Personality Factors Inventory. Of the total sample, 52% were found to show severe levels of addiction to alcohol. On the Personality test, the participants showed high levels of sensitivity, vigilance, dominance, openness to change, warmth, social boldness, perfectionism and low scores on liveliness and privateness. Emotional stability, privateness and perfectionism were identified as the factors determining the severity of the addictive behaviour. The researcher suggested that addressing the personality defects of the individual can help in preventing relapse, as it would address change at the causal level rather than the symptomatic level.

A qualitative study conducted by Mackinnon et al. (2019) explored the factors responsible for the development of addiction, maintenance of the condition and the factors that influence the treatment outcomes. Social drinking, functional use, stress and boredom were identified as factors responsible for the development of the drinking habit. This is then perpetuated by the habit of drinking alone without company, failed trials at refraining from consumption and determining the quantity of the drink based on the financial availability. Social factors and stress were reported to be the maintaining factors of addiction whereas lifestyle and personal resolve were stated to be the protecting factors. Other factors that prevented an individual to maintain abstinence from alcohol were recognized as lack of family support, physical withdrawal symptoms, peer pressure, stress, ready availability and exposure.

Effects of Alcohol Use Disorder

A study by Benegal et al. (2000) explored the social cost incurred by the consumption of alcohol in the state of Karnataka, India, in terms of earnings, expenditure on alcohol, debts

incurred, number of unworked days and loss of job. A total of 113 patients admitted to a de-addiction centre were assessed on the cost involved in their addictive behaviour. It was reported that an individual earned a mean of Rs.1660.95 per month but the amount spent on drinking per month accounted to Rs.1938.40, showing that the expenditure overtook the income. An average debt of Rs.8388.29 per month was reported to be incurred by month. In terms of number of days not working, it was shown as 13.53 days per month and 18.1% of the sample had experienced a loss of job. The other findings of the study stated that 59.4% of families were supported by the earnings of another family member and 9.7% of families sent children below 15 years of age to work. Though the government had reported an income of Rs.581.5 crores through taxation on alcohol, the expenditure on treating hospital costs of people with AUD was reported to be Rs.1147.48 crores, showing the social loss incurred through alcohol consumption.

An exploration of the relationship between alcohol overuse by the partner and mental health of women was explored by Nayek et al. in 2010. The study collected data from 821 women within the age range of 18-49 years in Goa, India. Excessive alcohol use by the partner was found to increase the risk of mental health disorders in women by two-fold. Violence and other alcohol-related problems were reported to mediate the chances of developing mental health problems. The woman's attitude towards the drinking behaviour of the partner and partner-inflicted-violence played a major role in mediating the risk of developing a disorder. The researchers suggested that handling violence towards women and other alcohol-related problems should be taken into consideration when developing interventions.

A study conducted by Benegal et al. (2011) collected data from five regions in India by both quantitative and qualitative means to study the course of AUD. Looking into the negative outcomes of AUD, it was reported that regular alcohol use had an impact on the financial status, physical health and social life of the individual. Most users had reported problems in the area of maintaining healthy relationships between couples, within families and with outsiders. Other effects presented by the users were alcohol perpetrated violence, physiological health issues, marital discord, job loss and damage in social relationships as well as involvement with the legal system. People showing regular habits of alcohol consumption were found to have higher risk for developing health conditions such as liver cirrhosis, ulcer, skin diseases, joint pain and

respiratory illnesses. An overall state of a lower well-being was observed among all individuals with AUD.

A research by Sidhu et al. in 2016 explored the influence of parental alcohol use on the development and behaviour of children. The study included 25 children between the ages of 6-18 years, with at least one parent diagnosed with Alcohol Dependence Syndrome, assessed using the Child Behaviour Checklist and the Family Evaluation Scale. Children of Alcohol abusers were found to both internalise and externalise the family situation, with girls showing a higher level of internalisation and boys with a higher level of externalisation. Dysfunction was observed in areas of physiological health, personal growth and social relationships. Anxiety, affective disturbances, somatic problems, attention deficiency or hyperactivity and oppositional defiant conduct were observed among the children showing the influence of the family environment on their development and behaviour.

A summary of reviews formulated by Arelingaiah et al. (2017) compiled the challenges faced by children of parents addicted to alcohol and the measures taken in remediating them. The authors reported that children of parents addicted to alcohol tend to be more vulnerable than other children, are risk-taking, sensation seeking, impulsive, have low resilience and are prone to encounter neurodevelopmental disorders. Social learning or modeling was quoted to be the most relevant theory explaining the personality of the children. The authors had also quoted various remediation groups available around the world for assisting these children such as Stress Management and Alcohol Awareness Program, Students Together and Resourceful and Life Skills Intervention, aimed at creating awareness, educating them and enhancing their skills as well as coping abilities.

Though various theories propose that alcohol consumption in regulated levels have benefits, a recent review has reported that any amount of alcohol consumption poses negative health effects. With the increasing number of health issues globally, even low to moderate consumption was stated to pose risks in the development of various acute and chronic diseases. Alcohol was found to be the cause of 48% of liver cirrhosis, 27% of road accidents, 26% of oral cancer, 20% of tuberculosis, 13% of epilepsy, 11% of colon cancers, 7% of hypertension and 5% of breast cancer cases globally. The amount of alcohol consumed, pattern of consumption and

the quality of the drink consumed were found to be major predecessors of the extent of health related ill-effects caused (Iranpour & Nakhaee, 2019).

Effect of Alcohol Use Disorder on Cognitive Abilities

A study by Bartl et al. (1996) was aimed at exploring the effect of alcohol intoxication on the cognitive performance of 56 males, tested through the driving abilities of the participants. The study sample were divided into two groups, the experimental group with 34 individuals subjected to alcohol consumption through a social event the control group with 22 sober individuals. When under the influence of alcohol, the subjects were tested on their driving abilities. It was observed that when driving, the subjects showed three times more errors on concentration tests and two times more errors on reaction tests and observation tests, though there was no significant difference in the quantitative tests aimed at measuring the actual cognitive abilities of reaction time, concentration and observation. This showed that cognitive abilities performed with deliberation were left undisturbed by the consumption of alcohol, but the latent abilities were affected.

A research study conducted in 2013 by Kuzma et al. studied the association between a history of alcohol use and cognitive impairment as well as memory impairment in later life. The researchers studied the history of alcohol use among 6,542 middle-aged adults using the three-item modified CAGE questionnaire. Their cognitive level was assessed on a longitudinal basis biannually for four years using the 35-item modified Telephone Interview for Cognitive Status. The results showed that a history of alcohol use doubled the risk for memory impairment in later life. Cognitive impairment was also found to be associated with a history of alcohol use though the relationship was statistically insignificant.

A review was conducted by Bernadin et al. (2014) with the aim of summarizing findings related to cognitive impairment caused as an outcome of alcohol dependence. The authors stated that about 50-80% of individuals who are dependent on alcohol tend to show cognitive impairments. Neuro-anatomical alterations, hippocampal atrophy, vitamin deficiencies and reduction of white matter were stated to cause impairment. Major cognitive dysfunctions were found to be in terms of working memory, episodic memory, mental flexibility, attention, response inhibition as well as visuo-spatial functions. The reviewers emphasized the role of

cognitive functioning in maintaining abstinence and also suggested including management of cognitive impairment in the treatment plan.

A study conducted by Ambedkar and Goyal (2017) aimed at assessing the cognitive and executive functioning of people with alcohol dependence syndrome and reassessed the same after four weeks of abstinence. The study included 50 males diagnosed with alcohol dependence between the ages of 20-50 years. Severity of alcohol use was studied using the AUDIT and the cognitive functioning was assessed using the PGI Battery of Brain Dysfunction. The cognitive functioning was initially assessed two days after medication at the pre-treatment level and after one month at the post-treatment level to study the effect of abstinence. The results showed presence of cognitive impairment in areas of memory, intelligence and perceptual-motor functioning in the pre-treatment phase and a slight betterment of scores in the post-treatment phase, thus showing the impact of alcohol dependence on cognitive functioning. The researchers suggested that the inclusion of the cognitive domain when framing treatment plans can be helpful.

A research exploring the cognitive deficits in people with AUD was conducted by Gupta et al. (2018) with the aim of developing a cognitive examination, specialised for AUD. The study collected data from 90 patients between the age group of 20-60 years using the Mini Mental Status Examination (MMSE), SADQ and the NIMHANS Neuropsychological Battery to explore the extent of cognitive damage. The results showed deficiency in areas of perceptual speed and accuracy, motor response speed, working memory, verbal memory and visuo-motor coordination. Based on the statistical significance of measures, the assessment on motor response speed, working memory and verbal memory were included in the suggested cognitive assessment tool for people with AUD.

A research study by Sharma et al. (2018) explored the cognitive impairment of people abusing alcohol, after abstaining for two-weeks. The researchers collected data from 44 males between the ages of 35-50 years diagnosed with alcohol dependence according to the ICD-10 and 44 normal males, using the CAGE questionnaire, AUDIT, MMSE and the Montreal Cognitive Assessment (MoCA). Individuals with alcohol dependence were found to obtain lower scores on the MMSE and MoCA compared to the normal males, showing presence of cognitive impairment. It was concluded that mild to moderate consumption of alcohol can lead to cognitive

impairment. The researchers also suggested that people with alcohol abuse shows clear evidence of cognitive impairment after 3 weeks of regular consumption.

Another study by Viswam et al. (2018) explored the cognitive abilities of people with AUD in the post-detoxification phase. They examined the cognitive functioning of 56 males above the age of 18 years using the MoCA and Frontal Assessment Battery. The results showed presence of global cognitive impairment in 81% of the participants and frontal executive dysfunction in 16% of the patients, showing that 4 out of 5 patients experienced cognitive impairment post detoxification. The researchers also explored the motivation level of the participants towards abstinence from alcohol using the Stages of Change Readiness and Treatment Eagerness Scale. It was found that frontal executive damage had a negative correlation with the readiness to change.

A study conducted by Ghogare and Saboo in 2019 aimed at exploring the cognitive impairment in people with AUD. Data was collected from 100 males between the ages of 18-50 years, diagnosed with the condition according to the criteria of the DSM-V. The tools used were the MMSE, Brief Cognitive Rating Scale and the Bender-Gestalt Test. The results of the study showed that 64% of the patients had cognitive impairment as a result of the AUD. It was also reported that there was a significant influence of age, marital status, duration of drinking and early age of exposure on the presence of cognitive impairment.

Effect of Alcohol Use Disorder on Neuro-Behavioural Functioning

A study by Karthikeyan (2013) explored the Neuro-Behavioural damage experienced by people with AUD (AUD), comparing the functioning of 30 participants diagnosed with AUD and 30 participants without AUD. The participants were assessed using the MINI, AUDIT, SADQ, and a neuropsychological battery comprising of the Rey-Osterrieth Complex Figure Test, Trail Making Test, Rey Auditory Verbal Learning Test, Digit Span Test, Stroop Test, Animal Naming Test and Controlled Oral Word Association Test. The results of the study showed that the group diagnosed with AUD showed impairment in the areas of attention, executive function, short term memory, working memory, verbal memory and verbal fluency. It was observed that the experimental group severely underperformed when compared to the control group, thereby showing evidence for the presence of neuro-psychological damage in people with AUD.

A study by Oscar-Berman and Marinkovic (2014) was aimed at consolidating the changes in the brain of regular users of alcohol and the relative damage in functioning. The review reported that structural changes were observed in the frontal lobe, limbic system, amygdala, hippocampus, hypothalamus and cerebellum in addition to the impairment in the axons that carry information to the prefrontal cortex, septal nuclei and the medial dorsal nucleus of the thalamus. These brain changes led to functional changes in the higher mental processes such as attention, decision making and judging, emotional imbalances, impulsivity and aggressive behaviour. There were also alterations in the biological drives of hunger, sex and sleep, response inhibition, language abilities and impairment in learning and memory. Abstinence was found to reverse changes in certain brain areas and in the restoration of neurotransmitter balance. Specific regions showed minimal reversal whereas other regions showed no change, indicating the necessity for treatment, be specifically designed.

A review conducted by Sachdeva et al. (2016) summarized the findings of different studies on the cognitive damage caused by AUD. Though different studies have stated different levels of alcohol use to be risky, it has been found that the highest intensity of cognitive damage occurs in people who have co morbid psychological and physiological damage. Shrinkage of brain volume, changes in glucose metabolism and alterations in the composition of the blood have been identified to cause the cognitive damages. Decrease of neuronal volume had been reported to be seen in brain regions such as the prefrontal cortex, frontal association cortex, cerebellum and the hypothalamus, leading to impairment in executive functions such as fluency, working memory, motor speed and other visuo-spatial deficits. It was also stated that abstinence can repair the above said damages to a certain extent and that repeated withdrawals can lead to the worsening of cognitive damage.

Extended Effects of Alcohol Consumption

A research effort at Goa, India aimed at understanding the perpetuation of violence caused under the influence of alcohol. The study was conducted by D'Costa et al. (2007), where 1567 participants were interviewed on their habit of alcohol consumption, family history and other demographic details, episodes of violent behaviour and the severity of their drinking behaviour. Out of the participants included in the study, 49% men and 19% women reported to

consume alcohol. The findings showed that 36% of violent acts committed by men and 27% of violent acts committed by women were caused due to alcohol abuse.

A study by Esser et al. (2017) was aimed at studying the tangible and intangible harm caused on individuals by strangers under the influence of alcohol. The study interviewed 7332 adults from different households across five states in India, including both rural and urban localities using a set of twelve questions regarding the harm inflicted upon them by strangers' alcohol consumption. It was reported that 63.2% of the sample had experienced harm from a stranger under the influence of alcohol, with 47.4% of the harm being tangible i.e., physical or sexual and the rest being intangible i.e., psychological. Physical harm was experienced by about 20% of the sample, with a higher incidence of harm being caused by males. In rural areas there was found to be a higher occurrence of tangible harm rather than intangible harm and vice versa in the urban settings. The researchers suggested that necessary changes be made at the policy level and treatment facilities be increased for people with AUD. This would decrease the ill-effects caused by alcohol use on self and others.

A study by Vaishnavi et al. (2017) explored the impact of Alcohol Dependence Syndrome on the caregivers of patients. Based on the inclusion and the exclusion criteria, 200 patients and caregivers were recruited for the study and assessed using the SADQ and the Family Burden Interview Schedule. Out of the studied sample, 52% showed mild, 31% showed moderate, 15% showed severe and 2% very severe dependence on alcohol. On the caregiver burden measure, 58% of caregivers showed severe burden, 36.5% showed moderate burden and 5.5% reported no subjective experience of burden. The major disturbances experienced by the care-takers were in the domains of financial responsibility, fulfillment of the daily routine and maintenance of a healthy family interaction. They also reported a disruption in the psychological well-being with experiences of loss of sleep, irritability, depressed mood and death wish.

A study exploring the impact of 'alcohol abuse of others' on school-going adolescents assessed the harm caused, using the Thai Health Questionnaire on Harm to Others from Drinking Test. Data was collected from 7560 adolescents between the ages of 12-19 years from 73 schools in Ernakulam district, Kerala. Experience of adverse effects was reported by 44.5% of the participants, both within the family and by outside members. Psychological harm was reported by 43.3% while physical harm was reported by 9.7% of the sample. Other forms of harm

included property and financial harm. Boys reported higher degrees of ill effects than girls, and they also stated being harmed by outsiders more often than family members whereas girls experienced higher degree of damage from family members. This effect was manifested in terms of substance abuse, psychological distress, suicidal ideation and other psychological conditions (Jaisoorya et al., 2018).

A study on similar lines was conducted by Rani et al. (2019) exploring the harm caused by others' drinking on college students in Ernakulam district, Kerala. Data was collected from 5784 male and female college goers in the mean age of 19.5 years, using the Thai Health Questionnaire on Harm to Others from Drinking. The findings of the study reported that 68.7% of the study population experienced harmful effects from the drinking behaviours of others. A majority experienced psychological harm (68.7%), physical harm (15.2%), financial harm (20.9%) and property-related harm (5.0%). Most of the psychological and physical harms were reported to be inflicted by strangers, with male part-time employees being the most affected by the drinking behaviour of others. The researchers suggested that intervention programs be aimed at helping individuals experiencing second-hand harm.

Treating Alcohol Use Disorder

A review carried out by Willenbring (2010) explored the necessary markers that are to be altered when treating people with AUD. He suggested that there is a need for reducing the risk of developing AUD in addition to treating those who have already fallen prey to it. Conventional treatment strategies were said to include psycho-educational lectures, group counselling and referral to AA groups which were not found to be very effective. Need for an integrated team of physician, psychiatrist, nurse, social worker along with a psychologist was insisted upon. It was opined that early diagnosis of the condition can be helpful and that the outcome of treatment would be better if it was sought voluntarily, with a readiness to change the non-treatment factors such as family environment, occupation in addition to the treatable factors. The researcher had concluded that there is a need for developing a basic science of behaviour change based on the complex dynamic system of the interactions between the physiological, psychological, behavioural and social aspects of addiction.

A similar review by Prabhu et al. (2010) had recommended certain intervention strategies that would be effective for the Indian setting, based on the prevalence, nature and impact of the condition. It was stated that the Community Based Rehabilitation model had proved to be an effective means of treating AUD where, individuals abusing the substance were treated in localized camps conducted in rural areas. They had also suggested that creating awareness regarding the harmful effects of the substance would not only educate the masses, but also de-stigmatize the problem. Additional directions include necessitating proper treatment facilities being set up and a referral towards treatment being made at various levels such as that of health care professionals, development officials, legal department and Non-Governmental Organisations. The researchers had also insisted the need for proper screening and assessment of the condition, with a unified effort made by different stake-holders.

A study conducted by Nadkarni et al. (2017) explored the effectiveness of Counselling for Alcohol Problems (CAP) in addition to Enhanced Usual Care (EUC) in people with AUD. The study included 377 participants (188 to the EUC+CAP group and 190 to the EUC) who scored in the range of 12-19 on the AUDIT and fell within the age range of 18-65 years. Counselling focused on aspects of relapse, quantity of drinking, resuming work, suicidal ideation, intimate partner violence and the financial burden caused due to alcohol over use. The results showed that participants in the EUC+CAP group showed better improvement on the AUDIT scores when compared to participants in the EUC group, reiterating the need for psychological support in addition to standard treatment.

A study by Holla et al. (2018) explored the effectiveness of the anti-craving drug Baclofen in relapse prevention among those treated for AUD. A Functional Magnetic Resonance Imaging cue-reactivity test was conducted on the experimental group consisting of 23 AUD patients before treatment and after Baclofen prescription for two weeks. The control group consisting of twelve patients with AUD did not receive the Baclofen prescription. The results showed that the group treated with Baclofen was observed to have higher activation of the bilateral dorso-lateral pre-frontal cortex as well as the right Anterior Cingulate Cortex and decreased activation of the insular cortex, which delayed the first incidence of alcohol consumption during the 90-days period post treatment. The researchers concluded that Baclofen helped in reducing cue-reactivity, thus delaying relapse.

A review by Mattoo et al. (2018) described an alternative method of treating individuals with SUD, by application of Brief Intervention. The authors stated that Brief Intervention can be offered at various settings by different health professionals who are trained in applying it. The intervention framework has been divided into six steps namely, Feedback, Responsibility, Advise, Menu for Change, Empathy and Enhancing Self-Esteem denoted by the acronym FRAMES. Based on Prochaska and Declemente's Trans-theoretical Model of Change, it focuses on bringing about change in behaviour by leading a client through the stages of precontemplation, contemplation, action, maintenance and relapse prevention. The researchers have suggested that such alternative, brief and motivation enhancing interventions are necessary in the field of addiction prevention and management applied in addition to traditional treatment methods.

A case-study by Sudhir (2018) explained the application of CBT in the management of addiction where, a 45-year old male with alcohol addiction was treated. The subject showed a family history of drinking, had an anxious personality, was poor at coping, was dependent on alcohol and believed in the positive reinforcing properties of alcohol. The therapeutic measures involved the identification and breaking down of the antecedents and cues to drinking, enhancement of self-efficacy, reconstructing the lapse-relapse pattern, enhancing motivation to change and reworking on the past experiences of being unable to control drinking. Behavioural skill enhancement, Social skills training, environmental manipulation and management, mindfulness training and the coupling of other third-wave therapies to the practice of CBT can be effective in treating addictions.

Enhancing Treatment for Alcohol Use Disorder

A research effort by Nattala et al. (2010) was aimed at exploring the effect of family members being included in the rehabilitation process and testing its effectiveness in preventing relapse. The study included 90 males, who were randomly assigned to three different groups with 30 samples each, namely, Individual Relapse Prevention (IRP) where only the individual was included in relapse treatment, Dyadic Relapse Prevention (DRP) where a family member was included in treatment along with the patient and the Treatment as Usual (TAU) which received the usual treatment without relapse prevention. The behaviour of the subjects in relation to alcohol consumption and outcomes was measured after 6-month of termination of the treatment.

The data was recorded in terms of quantity of drinking, frequency of drinking, number of dysfunctional days in the family, occupational and financial dimensions. The results showed that the DRP group performed better in controlling alcohol consumption with lower inclination towards relapse when compared to the IRP and TAU groups.

A study by Willenbring (2014) reviewed the need for early intervention for problem drinking and related behaviour. The study aimed at consolidating the results of previously conducted research studies that explored the need for early intervention, i.e., preventive care provided through primary health care, aimed at treating alcohol abuse at the initial stages, rather than offering treatment post diagnosis of the condition. It was widely observed that most patients sought treatment only at emergency situations or when the addiction resulted in functional impairment. The findings of the study showed evidence for the effectiveness of Screening and Brief Intervention offered at an earlier stage. The researcher emphasized the need for filling these gaps in the treatment of AUD and recommended for early intervention aimed at preventing the condition rather than treating at later stages.

A review article by Menon and Kandasamy (2018) has focused upon the need for relapse prevention in addictive disorders. The article endorses the theory and applications of relapse prevention, based on the approach of CBT. According to the authors, relapse is said to occur in high-risk situations where, the individual makes an irrelevant decision aimed at attaining an immediate gratification due to which he/she experiences the Abstinence Violation Effect. The factors influencing the high-risk situations are classified into intrapersonal factors such as physical or psychological response to stress and interpersonal factors such as social networks or exposure. It is suggested that incorporating measures such as maintaining a balanced lifestyle, learning to control response to stimuli, training on urge management techniques and the creation of relapse road-maps when coupled with treating other neuro-cognitive aspects of relapse can be effective.

A study by Bandawar et al. (2018) summarized the role of technology in the prevention and treatment of addictive disorders and their applications. The study discussed the role of mobile applications in recording the cues that stimulated the drinking behaviour in regular drinkers, providing treatment to the patients and the management of abstinence and relapse. The use of technological tools were also reported in areas such as tele-consultation, online

counselling, game-applications which assisted the de-addiction treatment. Applying software-based tools in intervention as well as the use of other online activities such as social networking and online education were also found to help in the management of the condition.

Carvalho et al. in 2019 reviewed the need for treatment of AUD at the primary health care level. The researchers stated evidence of the prevalent treatment strategies to be effective and efficient in treating AUD. It was reported that the condition is of high prevalence owing to the stigma associated in seeking treatment and the lack of systematic screening procedures. The researchers suggested that treatment measures for AUD can be expanded by designing stage-wise screening measures and management strategies. Making treatment accessible by keeping the environment more supportive to those who seek care, coupled with the establishment of competent control policies, will be helpful.

Inhibitions to Treatment

A research effort aimed at analyzing the outcomes of AUD was conducted by Dutta et al. (2014) exploring the condition in a rural area of Kancheepuram district. A structured questionnaire was used to obtain data from 157 males with a mean age of 37.20 years. Of the studied population, 35.7% were identified to be regular abusers of alcohol, out of which only 4.5% had sought treatment for the condition. Regular consumers of alcohol were found to have physiological illnesses such as liver damage, gastrointestinal issues and cardio-vascular problems. The family situation in 55.2% of people diagnosed with AUD was a factor inhibiting them to seek treatment, though they had the willingness to come out of the drinking habit.

A study by Probst et al. (2015) explored the reasons of why individuals with AUD refrained from seeking treatment for their condition. The researchers collected data through interview method from patients (n=1008) at primary health care centres of six different nations. In addition to the patient interviews, their level of alcohol use was assessed by a general health practitioner. The relationship of the factors were analysed which showed that 810 patients out of the 1008 were not willing to seek treatment. Commonly stated reasons were lack of awareness and insight, stigma and shame, encountering of barriers and fear of coping alone. Lack of awareness towards the harm caused by the substance and insight were found to reduce with increasing severity of addiction. Heightened instances of encountering barriers to treatment such

as family circumstances, financial difficulties, intrapersonal and interpersonal conflicts were stated as reasons to avoid treatment in people with severe AUD. The researchers recommended the need for widening the scope of treatment and increasing the availability of preventive care.

Shah (2017) in his review stressed on the harmful effects of alcohol and discussed the need for treatment strategies to refrain from its use. He stated that the damage caused by alcohol was widely under weighed, leading to lesser importance for treating the condition. Social acceptance of alcohol, lack of adequate awareness regarding the harmful effects of the substance, misconceptions related to its use in terms of health benefits and social status were identified as the factors leading to oversee the harm caused by it. He also stated that another major challenge in viewing this as a societal evil is the onus being upon the individual consumer of alcoholic beverages. He had recommended that creating more awareness towards refraining from alcohol and breaking the myths related to alcohol use can help in substantial reduction of the behaviour.

Individuals seeking treatment for AUD were observed to show low rates of adherence to the management strategies employed. The reasons for this lack of adherence to treatment were explored by a research study conducted by Kuchya and Kumar in 2019. The study involved observing the commitment of 73 males (mean age=45.7 years) in sustenance to treatment post discharge, where they were assessed using a semi-structured questionnaire, drug diary (record of drug consumption) and a self-report of their behaviour post discharge along with the Simplified Medication Adherence Questionnaire. The results showed a low level of constancy in following the treatment, with the reasons identified to be dissatisfaction with medications due to the adverse reactions of the drug, familial and financial reasons, lack of availability of the drug in their geographical location and forgetfulness.

Treatment Outcomes

A study by Maisto et al. (2014) investigating the course of AUD and its prognosis concluded that the condition is widely considered as one involving a progressive course. It was reported to pose a high risk of relapse and the direction of change post treatment was found to be varied among the consumers. The conclusions stated that this calls for the need to understand the course of the condition and the areas of damage, so as to formulate effective treatment methods. It had been suggested that the first ninety days post treatment play a crucial part in deciding on

the prognosis of the condition. Another benchmark in recovery was found to be the completion of the first year post treatment. Since total abstinence was considered as the only goal of the de-addiction program, understanding the factors fostering abstinence post treatment were suggested essential.

A study by Soundararajan et al. (2017a) explored the personality traits of people with AUD using the NEO Personality Inventory-Revised. AUDIT and the Advance Warning of Alcohol Relapse were used to explore their drinking severity and probability of relapse. The findings of the study stated that the extraversion level of an individual with AUD was high, hence indicating that high level of the trait can be a risk factor for both development of the condition and relapse. Earlier age of onset was also found to be a contributing factor. It was reported that people who had a combination of high sociability and low life satisfaction were found to show lesser rates of relapse.

A study conducted by Chauhan et al (2018) was aimed at exploring the factors that led to relapse among individuals seeking treatment for Alcohol Dependence Syndrome. The study included 200 males diagnosed with Alcohol Dependence Syndrome according to the ICD-10. The participants were screened using the CAGE Questionnaire and AUDIT to recruit 100 participants without a history of relapse. The chosen participants were assessed using the Relapse Precipitants Inventory, Dysfunctional Analysis Questionnaire and Armed Forces Medical College Life Events Scale. Craving, tension, stress and social pressure were identified as the major causes of relapse. History of alcohol use in the family, comorbid physiological illness and increased withdrawal symptoms were the additional causes. Dysfunctions in areas of social, vocational, personal, family and cognitive spheres were seen to be higher in relapsed individuals than among those without a relapse.

A research conducted by Kumar & Veenaa (2018) explored the factors that influence the outcome of treatment for alcohol dependence and relapse. The study was aimed at identifying the psychosocial factors leading to relapse, causes of early relapse, factors influencing delay in seeking treatment and the interaction between the different factors which play a role in seeking treatment and relapse post treatment. Data was collected from 100 samples using a semi-structured proforma along with the SADQ, Alcohol Relapse Risk Scale and the Duke's Social Support and Stress Scale. The results showed that 68% of people taking treatment for Alcohol

Dependence Syndrome relapsed within the first year and 24% relapsed within the second year. The major factors influencing the above said areas of treatment seeking and relapse were identified to be family problems (57%), peer influence (39%) and alcohol craving (19%).

A research conducted by Santis et al. (2019) studied the white matter of the brain in regular consumers of alcohol during the initial two to six weeks of abstinence, using Diffusion Tensor Imaging technique. They observed the brain of healthy and alcohol-prone humans and rats, to study the changes in the white matter during the initial weeks of abstinence. Both rats and humans showed changes in the corpus callosum and the fornix regions of the brain between the healthy and the Alcohol-exposed samples, in terms of the myelination and reactions in the glial cells. Alcohol use was found to damage smaller nerve fibers and cause myelin irregularity, neuro-inflammation, excessive intracellular and extracellular fluid accumulation. Though these were found to heal during abstinence, there are no researches proving that mere abstinence would restore the brain cells.

Applications of Art Therapy

The application of art therapy on enhancement of cognitive functioning in children with mild mental retardation was researched upon by Hina (2010) at Karachi, Pakistan. The study included 80 special children between the ages of 4-9 years from ten different special schools. The performance level of the children was assessed prior to art therapy intervention through observation and check list method, summarizing the abilities they possessed. Art therapy intervention was offered through worksheets and activities which involved colours and shapes such as crayon shading, counting and sorting based on shape, size of objects. They were also subjected to craft work such as free hand painting, card making and bead work. At the end of the intervention, post-assessment using observation and check list of the performance of children showed improvement in the areas of cognitive functioning, perceptual, conceptual and literary skills. It was also reported that it provided for self-occupation making lesser need for close supervision. Thus the study confirmed the effectiveness of art therapy in enhancing cognitive functioning.

A study by Hagood (2011) aimed at investigating the use of art-based tools in measuring the cognitive development of children. The study included 34 primary schoolers between the

ages of 5-10 years. They were asked to record their responses to the Raven's Coloured Progressive Matrices, British Picture Vocabulary Scale and the Naglieri Draw-A-Person Test. The scores of the test were reported to be correlated with one another and there were no noticeable gender differences. The researcher had suggested that the three tests can be used in relation to one other so as to serve as a package for understanding the level of cognitive development in children.

A similar exploration of cognitive development through the use of art therapy was carried out by Shukor (2016), aiming at enhancing the physical, sensory, communication, social, emotional and cognitive skills of children with autism. The study involved three children diagnosed with autism based on the narrative inquiry case study method, exploring and developing their skills through the administration of art therapy as intervention. Art therapy was provided as two hour sessions twice each week for one academic year using the structured art lessons developed by the researcher. The Crayola Art Exploration Method was used to assess the developmental skills of the children and the artwork was analyzed using the Edmund Feldman's Art Criticism Method. Evidence showed improvement in areas of communication, socializing, managing emotions, creativity, physical and sensory functioning through enhancement of their social and cognitive skills.

A study by Anderson (2017) explored the effect of using art-based teaching on the acquisition of language skills in third-graders. The study included different types of art-based teaching strategies that were employed in the language training among third grade children. Activities included writing tableaux, role-playing, use of visual and auditory cues for the respective words learnt and the practice of art-supported reading, writing, speaking and listening. It was observed that the art-based teaching strategies had a positive impact in understanding the concepts better. The enhanced articulation of sounds and fostered recall of the words learnt had a positive impact on the language learning in children.

A research study verifying the role of art therapy in the enhancement of hand function in patients of rheumatoid arthritis was conducted by Khedekar et al. (2017). Owing to the monotony of performing hand exercises and lack of creativity from the performer's side, physiotherapy faced higher rates of attrition. In order to overcome this, a trial was conducted applying art therapy as intervention for people with rheumatoid arthritis in enhancing hand

movement, self-perception and quality of life. The study included 17 participants with Rheumatoid Arthritis who were divided into the experimental group receiving art therapy for intervention and the control group receiving conventional physiotherapy. The participants were provided sessions for 45 minutes each day for 4 consecutive weeks. Assessment was done using the grip and pinch strength, Grip Ability Test, Jebsen-Taylor Hand Function Test, Australian-Canadian Osteoarthritis Hand Index, Michigan Hand Outcome Questionnaire and Health Assessment Questionnaire. The results of the test showed art therapy to produce similar effects on pinch strength, gripping ability, hand outcome, self-perception and quality of life when compared to conventional therapy.

A review of studies on art therapy was conducted by Regev & Cohen-Yatziv (2018) summarizing the effectiveness of art therapy in adult clients. The review included 27 studies and the findings of the study listed seven groups of people in whom art therapy was found to produce positive change. The adult groups that have benefitted from art therapy include cancer patients, clients coping with different medical conditions, clients with different psychiatric conditions, clients coping with trauma, prison inmates, geriatric clients and clients with adjustment issues. The reviewers have suggested that future research should focus on expanding the scope of art therapy, testing its effectiveness under different conditions.

A research conducted by Mahendran et al. in 2018 aimed at analyzing the effectiveness of art therapy in the management of mild neurocognitive impairment in elderly. Art therapy involved two modules, Art Activity (AT) and Music Reminiscence Activity (MRA). The participants were divided into three groups, the first group receiving AT, the second group receiving MRA and a control group. Intervention was provided once a week for three months and fortnightly for six months. Neurocognitive assessments, psychological wellbeing levels and cellular age were measured at the baseline, three month and nine month time intervals. The results showed improvement of functioning at the three month and nine month interval when compared to the baseline level both in cases of the AT group and MRA group, showing the effect of art therapy in producing cognitive improvements.

A research was conducted by Koo and Thomas (2019) aimed at verifying the effectiveness of art therapy on children with Autism Spectrum Disorder. The study applied art therapy to nine children diagnosed with Autism Spectrum Disorder. The Childhood Autism

Rating Scale and the changes in the art performance activities were used to assess the functioning of the children before intervention and after eight sessions of individual art therapy. Statistical analysis showed a significant improvement in the cognitive, social and motor skills of the children. Content analysis of the drawings showed that the children had indicated progress in terms of the developmental art stages. Hence the researchers concluded that art therapy has a positive influence on children with Autism Spectrum Disorder.

Music and Cognitions

The effect of playing the keyboard, i.e., the effect of regular practice of a fine motor activity on the human brain was studied by Amunts et al. in 1997. The study took the intrasulcal length of the precentral gyrus (ILPG) as a measure of the brain plasticity developed as a result of regular keyboard practice. The ILPG of keyboard players and the control group were compared in order to verify the impact of fine motor skills training on the brain. The results revealed that the ILPG of both hemispheres were equal in keyboard players whereas the lengths did not match among the control group, with the ILPG of the left hemisphere being longer than the right. This indicated that fine motor activation can lead to permanent structural changes in the brain, which will in turn reflect upon the enhancement of cognitive functioning in those individuals.

A review by Fang et al. (2017) summarised the role of music as therapy in the cognitive enhancement of people with Alzheimer's disease. Music therapy was found to be effective in enhancing the autobiographical and episodic memory, and hence was proved effective in overcoming deficits in memory. In addition, there was improvement in areas of attention, psychomotor speed, orientation and executive functions. The effect of music on the brain was reasoned to be the ability of music to enhance neuronal response, increase neuronal count and improve the release of steroid hormones. The reviewers concluded that music therapy can be applied as a potential treatment mechanism for cognitive enhancement and increased efficiency will be seen when combining multiple modalities of art.

A similar review by Zhang et al. (2017) explored the ability of music in remediating the cognitive functioning in elderly dementia patients. The findings stated that music had been effective in remediating the cognitive abilities of the studied population. There was evidence for reduction in the levels of depression, anxiety and improvement in the quality of life of those

undergoing music therapies in addition to psycho-pharmacotherapy. Evidence also stated that the effect of music therapy was beneficial in regulating behavioural deviances and reducing disruptive behaviour. The reviewers suggested that music therapy can be used as a front-line non-pharmacological treatment for people requiring cognitive management.

A study by Gupta et al. (2018) explored the underlying mechanism which influences the efficiency of music in bringing about cognitive enhancement. The researchers studied the alterations in the neural networks post exposure to music using EEG measures and the functional connectivity of alpha band waves in the resting state. Functional changes in the brain were reported to show that listening to music reduced information flow between long-distance areas of the frontal and parietal cortex. EEG showed increased power in the regions of the pre-frontal and occipital cortex. Based on the findings, music was reported to enhance cognitive functioning by enhancing the global efficiency of the brain, enhancing the neural efficiency of the pre-frontal cortex and increasing sustained attention.

A study by Alain et al. (2019) explored the role of music and visual art in the enhancing the brain functioning among older adults. The study included 53 participants who were divided into three groups and were screened for intellectual, visual and auditory deficits at baseline in order to avoid interference of deficits in testing the effectiveness of the treatment strategies. The auditory and visual abilities of the individuals were stimulated using a Go-No-Go task coupled with auditory tones and the respective EEG measures were recorded. Following a three-month exposure to ++the music and visual arts training, it was observed that there was increased performance elicited by the cognitive task shown by the EEG recording. It was also observed that there was an enhancement in the neuroplasticity of the brain as a result of the art forms to which the subjects were exposed, but the effect tended to fade away with time.

Colouring and Cognitions

Hattori et al. (2011) aimed at identifying the effectiveness of drawing and colouring as intervention strategies in remediating the cognitive deficits experienced by people with Alzheimer's disease. The study included 39 individuals with mild Alzheimer's disease, tested using the Apathy Scale, MMSE and Quality of Life Scale. They were then randomly assigned to the experimental group exposed to drawing and colouring and the control group exposed to a

calculation-based learning exercise. The results showed that the group exposed to art therapy i.e., drawing and colouring showed significant improvement in apathy, mental status and quality of life after a 12-week intervention. The researchers suggested the need to employ techniques which would be motivating and interesting to the participants rather than the conventional methods.

A review by Deshpande et al. (2016) explored the possible measures that could be employed for the cognitive remediation of individuals with Schizophrenia. The review summarized the findings of different studies, providing a comprehensive inclusion of different activities that would be helpful in enhancing the cognitive functioning of people with schizophrenia. The reviewers suggested exposure to art activities such as music and colouring to be effective strategies in providing home-based cognitive remediation to people with schizophrenia. Changes in different regions of the brain that promote neuroplasticity and enhance neuronal transmission were reasoned to be the underlying cause of the remediation mechanism.

A research by You et al. (2016) explored the effectiveness of colouring as a cognitive remediation technique in people with dementia or probable Alzheimer's disease in Korea. A total of 138 individuals with probable Alzheimer's disease were tested on their cognitive abilities before and after intervention using the Korean version of the MMSE and their Activities of Daily Living were monitored. The participants were provided with sheets of images which they were asked to colour using crayons or colour pencil, one sheet per week. The post-test analysis revealed significant improvement in cognitive functioning, Activities of Daily Living and sleep quality of the participants. The researchers thus concluded that colouring can be provided as a low-cost, efficient means of cognitive remediation.

A study by Forkosh and Drake (2017) compared the effectiveness of drawing and colouring in enhancing the state of flow, ability of an individual to involve in a task that they perform. The participants (n=70) were assessed using the Positive and Negative Affect Schedule, Enjoyment Scale and Flow State Scale. They were tested at three stages, at the pre-test condition, after an induced negative mood state by recalling a sad event and after the intervention. Intervention was offered in terms of colouring and drawing. The results showed that drawing and colouring were equally effective in enhancing the affect state of the participants whereas

colouring was found to enhance the experience of flow, thereby keeping an individual more attentive and associated to the task that they perform.

Story-Telling and Cognitions

A review by Mar et al. (2004) explored the neuro-psychology of story production, story comprehension and the inter-relation between the two. The author summarized areas of the activation in the brain involved in the processes of story-production, selection and ordering of information to be included in the story and story-comprehension. The results showed overlap in the brain areas involved in the above activities, with increased activation in the frontal, temporal and cingulate areas responsible for working-memory and theory-of-mind processes. The researchers concluded upon the beneficial properties of Story-Telling and story-comprehension on the cognitive abilities of the takers, suggesting that further research upon the specific benefits of the activity can open wider arenas.

A study by Chu et al. (2016) explored the application of Story-Telling as a cognitive support framework in treating older adults with cognitive deficits. The researchers conducted an experiment of the mixed method with 17 interviews and 72 surveys. The aim of the study was to assess the potential motivating capacity of Story-Telling as a means of fostering cognitive activity in older adults. With the growing emphasis on technology and gamification, most participants conveyed discomfort with games as a tool for cognitive remediation. The researchers identified Story-Telling to be an effective supportive tool in enhancing cognition, which was also found comfortable to the participants.

A research by Isik (2016) was aimed at exploring the impact of Story-Telling on children. He performed an analysis of secondary data collected from different sources with the aim of analyzing the benefits of Story-Telling on the psychological and linguistic development of young children. He concluded that Story-Telling acts as an effective means of re-kindling the past experiences and hence provides multiple benefits in areas of psychological and physical well-being. He has stated evidence for enhancing cognitive abilities in children when narrating stories either in the mother tongue or other languages. The activity provides enhancement in linguistic abilities as well as other cognitive functions through imitational learning, impersonating and in making better judgments through analytical thinking.

A study by Yabe et al. (2018) explored the effect of Story-Telling on the brain of young children between 4 to 11 years. The neurological changes experienced during Story-Telling and picture-book reading was compared using the near-infrared spectroscopic method to analyze the blood flow to different areas of the brain when involving in the tasks. A total of 21 children were analysed on their brain activation where, picture-book reading showed reduction in blood flow to areas of the bilateral prefrontal cortex with practice. In Story-Telling, each trial was found to stimulate the same amount of blood flow in the children. The researchers thus suggested that Story-Telling is more effective in activating the brain when compared to picture-book reading and that it can be applied as a medium of educating and enhancing functioning.

Gabele et al. (2019) explored the impact of Story-Telling and quests on the cognitive rehabilitation of adults aged between 31-52 years. The team conducted a qualitative assessment of the experiences of 10 participants where, four showed need for cognitive rehabilitation and six were healthy individuals. The participants were subjected to a software-based rehabilitation tool, a single-player quest, the experience of which participants of the experimental group were made to recite as a story and participants of the control group were only subjected to the quest. Based on the subjective accounts provided by the two groups, it was reported that Story-Telling offered a subjectively perceived motivation to the participants, maintaining their interest in the rehabilitative activity and preserved their concentration. The researchers suggested that such interactive components be added to therapy so as to foster the rehabilitation process.

Need for Research

A review of previous researches conducted by Murthy et al. (2010) has summarized the nature of alcohol-related research conducted in India and the need for future research to be inclusive of the various perspectives towards alcohol use. The reviewers have stated that though enough research has been done on the prevalence and co morbidity of alcohol use, little efforts have been taken on the pharmacological and psychosocial areas. They have also reported that though initial researches were focused on the neurobiological substrates of alcohol addiction, there has been a deviation from the area in the recent days. They have suggested that constructive research should focus on ways of preventing and treating the condition in the Indian context.

From the above research efforts, it is evident that though efficient methods for the prevention and treatment for AUD through psycho-pharmacotherapy and principles of AA are prevalent, there is a dearth of efforts in bringing about cognitive remediation in the affected population. Art therapy being a novel field of rehabilitation has proved effective in enhancing the cognitive abilities in different conditions across age groups. The present study focuses on the need for evolving a treatment strategy that is more accessible, user-friendly, motivating, cost-effective and holistically targeted. The objectives of the present research are aimed to identify the effectiveness of employing Art therapy in bringing about cognitive remediation in people with AUD.