Impact In Brain Due To Alcohol -Note

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Abstract: Alcohol consumption is the leading risk factor for disease burden in developing countries and the third largest risk factor in developed countries and it is the most important universal health problem to adolescents. Heavy alcohol use increases the risk of stroke and cardiovascular disease. The brain is the most convoluted vital organ in the human body. It is the central nervous system of the body.When alcohol enters the brain each and every part of brain is associated with pressure and activates pressured area this makes the person drink again and again. Brain damage can affect many organs including memory, sensation and even personality. Binge drinking damages corticolimbic brain regions which are important for memory, decision-making and behavioral control and recent studies indicate that it results in detectable brain dysfunction So it is more significant to detect the affected regions of brain due to alcoholism to provide proper treatment for alcoholic patients. This paper focuses on the research made on alcohol addiction using MRI, Various tools and methods used by the Researchers.

Index Terms: SCAM, voxel based Morphometry, ADRs, BAL, NIAAA, myelinolysis

1. INTRODUCTION

Alcohol affects major parts of the body and it badly affects brain parts. The brain is one of the most complex organs in human body and it controls whole body function including Thinking, movement, memory, hearing, etc. A dipsomaniac man, even if knows the impact of alcoholism, consumes alcohol habitually due to the craving of brain. The ethanol content in the alcohol affects the brain and causes a craving for alcohol which makes the alcoholic person drink more. Since brain neurons are connected to all the part of our body it affects whole body if a person consumes alcohol .fact is that only 30% of alcohol is absorbed by the digestive system remaining 70 % of alcohol is directly sent to the brain and affects the brain functionalities and further, it leads to the dysfunction of brain. Hence it is more significant to detect the affected region of the brain for the better treatment of tippler Many types of research are developing in this field. Global level research reveals that alcohol could affect academic performance significantly. This is particularly important considering high prevalence of alcohol ingestion by college Students and their more vulnerable age. Brazilian studies with college student's detected prevalence of alcohol use between 65% to 92%.The mean prevalence of lifetime alcohol consumption in the research was 93.1%, a result that is line with those obtained by researchers in Sao Paulo(SP, Brazil), which detected a prevalence of lifetime use of 89.6% for women and 93.5% for men. A study carried out in Boston(USA) involving the college students between 21 -24 years old found out that students presented mood alterations A research work carried out at the University of Michigan revealed that most of the students grow up in a culture that equates the consumption of alcohol with having fun, relaxing, and making social situations complete and reducing tension. The University reported that as per the findings of the large scale research project conducted by the National Institute of Alcohol Abuse and Alcoholism (NIAAA), there is a significant percentage of college students die each year due to alcohol-related injuries and more incidents of assault among the students take place while they are under the influence of alcohol. Research work carries out in the University of Northampton (United Kingdom) on the "Student Choices and Alcohol Matters"(SCAM) based on cross-sectional survey and interviews revealed that majority of the students surveyed(83%) classified themselves as drinkers, with only 17% classifying themselves as abstainers. About 62.6% of the student drinkers reported that they consume alcohol at least once or twice a week and 19.6% reported drinking more often and 4.2% drank alcohol nearly every day. The female students drank more than the recommended maximum of 3-4 drinks per day, whilst 30% of male students drank more than the recommended limit of 5-6 per day. The study in South Africa States that 42.2% of men and 18.3% of women were found to be hazardous drinker .The research at Nigeria revealed that the 12 month prevalence of alcohol abuse in the community was 33.23% and 57.75% were social drinkers. The study in Venezuela stated that the prevalence of 86.5 among men and 7.5% among women.

2. National Status

The World Health Organization(WHO) released harmful use or bridge drinking leads to 100% of alcohol use disorder,18% of suicide,18% of interpersonal violence, 27% of traffic injuries, 13% of epilepsy, 48% of liver cirrhosis, 26% of mouth cancer 26% of pancreatitis, 20% of tuberculosis, 5% of breast cancer and 7% of hyperintensity .WHO in the report 2018 revealed that 3 Million death deaths every year occur by harmful use of alcohol and it is the factor in more than 200 diseases and injury condition on the whole 5.1 % of the global burden of disease and injury is attributable to alcohol. The report shows that there is a relationship between alcohol addiction and mental and behavioral disorder One Indian dies every 96 minutes due to alcohol consumption.

The author Clark and Tapert in the year 2018 studied that alcohol is toxic to the immature brain. The University scenario in India reveals that most of the students consume alcohol on special occasions (54%) and 25% consume on weekends only. 8% of students consume on alternated days, known as Binge drinkers. [14] Imaging techniques help the researcher to gather large amounts of information. These brain-imaging techniques have contributed extensively to understand the effects of alcohol abuse and dependence on structural and functional changes in the human brain. Today medical field generates large amounts of medical data which is useful for the Diagnosis. Imaging techniques and images play major role in diagnosing various types of diseases and these data should

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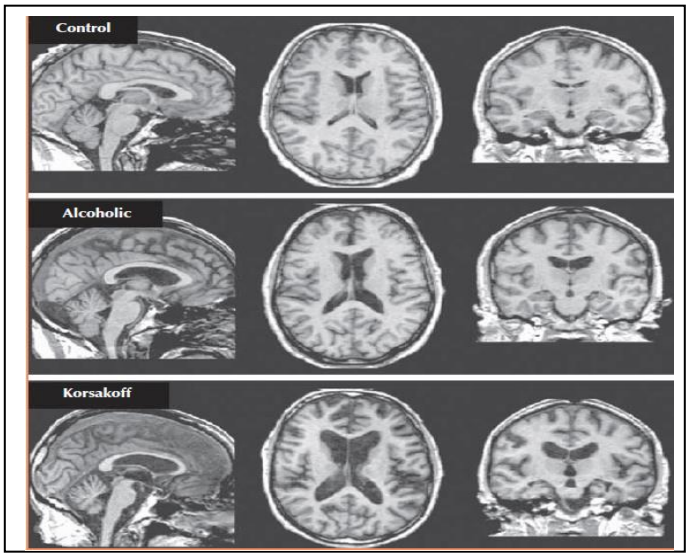
be mined for better understanding and to know useful patterns, hidden data in it. There are different imaging modality namely CT,MRI,PET, etc… MRI has widely used imaging modality for head injury. Much research is going on how alcohol is related to brain damage. Imaging techniques have revealed that chronic alcohol use is accompanied by volume reductions of gray and white matter as well as microstructural disruption of various white matter tracts which results in metabolic changes in the brain, lower glucose metabolism, and disruptions of the balance of neurotransmitter systems.The brain is most vulnerable to alcohol and the substance used in the alcohol hijack brain circuit which makes people crave to drug causing a number of Psychiatric disorders.. The damage to the brain makes it more sensitive to alcohol and other related drugs. MRI is capable of detecting abnormalities that can occur with alcoholism as well as changes that can occur with sobriety and relapse. The brain pathology associated with chronic excessive alcohol consumption is well documented with imaging of the living body (i.e., in vivo imaging). MRI is the modality that is used to find gross white matter structural abnormalities (i.e., dysmorphology) observed postmortem by showing evidence for white matter volume shrinkage with chronic heavy drinking. Recent research on MRI distinguishes alcohol-related brain effects that are permanent from those that are reversible with abstinence.

3 Change in Gray matter and white matter

Jaime S ”Gray Matter volume correlates of global positive alcohol expectancy in non-dependent adult drinkers”. Alcohol misuse leads to structural brain changes Many researchers have made their research on gray matter volume independent (alcohol addict) they have used voxel based Morphometry for analyzing global positive scale of alcohol expectancy they found alcohol expectancy is primitively connected with GM volume of left Pre-Central Gyrum(PCG) in men and women , combined and bilateral Superior Frontal Gyri(SFG)in women and negative correlation with GM volume of right ventral putamen in men further it shows that mediation analyses showed that the GM volume of PCG mediate the correlation of alcohol expectancy and the average number of drinks consumed per occasion and monthly total number of drinks in the past year. When recent drinking was directly accounted for in multiple regressions [15] Heikkinen N et al in his paper “Alcohol consumption during adolescence is associated with reduced grey matter volumes” found that alcoholic person has abnormal growth of gray matter. The objective of his work is to compare the grey matter volumes of heavy-drinking and light-drinking adolescents [19] Bridge drinking damages white matter the paper “Alcohol intake and brain white matter in middle aged men: Microscopic and macroscopic differences” discuss the white matter changes due to alcohol consumption by Linda K.Mcevoy et al . in this paper diffusion Measure due to Alcohol was Quantified from 12 different major white matter tracks.Mixed effects linear Model were used to analyze the difference in Diffusivity and WML

4 Brain and Disease associated with alcohol

Alcohol is considered to be worst drug in the world. It affects the brain structure and functions of brain. The damage in brain due to alcohol is categorized in to primary region target and secondary region target. The Primary region is the regions which gets affected quickly or vulnerable to alcohol and the secondary region is the region get affected in slowly.



4.1 Primary Region and Disease associated with it

Wernike’s Encephalopathy - The deficiency of thiamine (vitamin B-1) leads to the disease Wernicke’s Encephalopathy. It causes confusion, muscle incardination and vision problems and it affects organs like Mammillary bodies, Periaqueductal gray matter, dorsal medulla, tectal plates,olivary bodies, pons tissues surrounding 3rd ventricle parts.It also causes disease like Korsakoff’s syndrome when Hippocampus ,Thalamus and Orbit frontal Cortices get affected by alcohol Hepatic Encephalopathy – Alcohol content affects these portions of brain Globus Pallidus, Nigra, which causes a disease named EncephalopathyCentral Pontine Myelinolsis - Central Pontine Myelinosis is caused when pons gets affected. Alcoholic cerebellar Degeneration and Alcohol-Related Dementia Cerebellar degeneration and Alcohol-Related Dementia are the diseases caused when content in alcohol affects frontal cortex portion of brainVarious form of dementia are Alzheimer's disease, Pankinsons disease, mixed cognitive impairment, Frontotemporal Dementia, Vascular Dementia, Normal pressure Hydrocephalus, Mixed dementia, Huntington's Disease, Dementia with Lewy bodies, Wernicke – Korsakoff syndrome Marchiafava-Bignami DiseaseMarchiafava-Bignami Disease is the disease caused by alcohol addiction and it affects the part of brain callosum Organic brain damage seen in heavy drinkers includes. An atrophic change like Frontal atrophy, Temporal atrophy, Sulcus dilatation, Dilatation of lateral ventricle, Dilatation of third ventricle, Atrophy of cerebellum and vermis, Atrophy of mamillar body. Vascular Damage like Infarction, lacunae, and bleeding mainly due to hypertension, So-called leukoaraiosis mainly due to hypertension, T2 high-intensity spots and maculae mainly due to dyslipidemia 4. Periventricular hyperintensity Vitamin deficiency like Wernicke’s and/or Korsakoff’s syndrome mainly due to thiamin deficiency, Pellagra encephalopathy mainly due to nicotinic acid deficiency, Marchiafava–Bignami syndrome Traumatic Damage like Cerebral contusion and hemorrhage, Subacute hematoma , Chronic subdural effusion, Diffuse axonal injuryOsmotic change like Central pontine myelinolysis , Extra-pontine myelinolysis other problems like Hypoglycemic coma , Carbon-monoxide poisoning , Fetal alcohol syndrome , Severe hepato–cerebral syndromeAlcohol targets the secondary brain regions like Cerebellum, pons, corticospinal tract, cortex, basal

ganglia, thalamus,cerebral gray, white matter junctions, and cortex.

Related Research on this Topic

Data mining [5] in detection of brain injury is an emerging field of high importance for providing prognosis, treatment and a clear understanding of how the brain functions. The field of data mining is addressed the question of how best to use this data to discover new knowledge and improve the process of decision making. New technologies [6] are invented to examine physical conditions and finding symptoms of the different disease. There is a huge amount of data involved with it including a patient's past medical records, examination history, and even the personal details. Alcohol [7] is prescribed to patients for curing diseases and improving their health. But sometimes it may lead to negative side effects which can worsen a patient's health. This negative side effect is referred to as Adverse Drug Reactions (ADRs). They can cause serious injury in the human brain and also some other health problems including hospitalization, permanent disability.The article at the National Institute of Alcohol abuse reviews studies using three different types of magnetic resonance imaging to scan and measure the effects of excessive chronic alcohol consumption considering brain size, shape tissue quality here it is the structure of the tissue, and function means the blood flow. To assess the immediate effects of chronic excessive drinking on the brain and cognitive and motor performance, investigators most commonly test alcoholics shortly after they enter treatment and compare them with low alcohol-consuming study participants (i.e., control subjects) of similar age, sex, and socioeconomic level [1] Some research who made research on Alcohol and brain damage gave evidence that white and gray matter reduction is associated with alcoholism. The author De Bellis MD et al found that alcohol addiction is associated with white and gray matter changes in his paper "Prefrontal cortex, thalamus, and cerebellar volumes in adolescents and young adults with adolescent-onset alcohol use disorders and comorbid mental disorders" the Modality used in this research is MRI. Data set are gathered from Substance abuse treatment program. The dataset is divided into two groups namely Alcoholic and Controlled groups. This research took 14 images in which eight were male and six of them are female and they are of the are 17.0 +/-2.1 years. Findings made by this author is alcohol use disorders had smaller prefrontal cortex and prefrontal cortex white matter volumes compared with control groups. Right, left, and total thalamic, pons/brainstem, right and left cerebellar hemispheric, total cerebellar and cerebellar vermis. There was a significant sex-by-group effect, indicating that males with an adolescent-onset AUD compared with control males had smaller cerebellar volumes, whereas the two female groups did not differ in cerebellar volumes. Prefrontal cortex volume variables significantly correlated with measures of alcohol consumption. The author concluded his paper has further studies are needed for examining smaller regions and which are the regions vulnerable for alcohol addiction [2] Medina et al in his paper "Prefrontal cortex volume in adolescents with alcohol use disorder :Unique gender effects" worked on alcoholic brain image of adolescent people and change in brain. The research focused on prefrontal cortex of men and women .they have examined that the alcohol addicted patients have smaller prefrontal cortex and White matter of alcohol addicted person has been changed. It gives evidence for further research by concluding white matter have been reduced in this area. This paper concludes that alcohol use during adolescence is associated with prefrontal volume abnormality. They have found that alcoholic people have a morphological patterns in the brain. Region of Interest mask was applied to the white matter area to extract quantification of white matter. Limitation of the work is stated that work as follows due to the cross-sectional nature of this study the directional and developmental relationship of prefrontal cortex morphometry and alcohol use cannot be clearly ascertained the study which examines the developmental trajectories of male and female adolescents will help to ascertain these association the structural abnormalities in the white matter anterior to gene of corpus callosum highlight the need for additional animal and human research examining the interaction between gender and alcohol use on PFC neurodevelopment. The article Alcohol Res Health "Evidence for Brain Degeneration among Alcoholics and Recovery With Abstinence" reveals that MRI Modality is a safe and noninvasive method to examine the brain macrostructure and microstructure. They have evidenced that MRI has the capability to detect the abnormalities in brain which is caused by alcoholism. The research shows the correlation between brain structure and quantitative neuropsychological testing demonstrates the functional consequences of the pathology. The multifaceted nature of alcoholism presents unique challenges and opportunities to understand the mechanisms underlying alcoholism induced neuropathology and its recovery. Longitudinal MRI studies of animal models of alcoholism. Krista Lisdahl Medina et al in his paper "Effects of Alcohol and Combined Marijuana and Alcohol use during Adolescence on Hippocampus Volume and Asymmetry" says that the hippocampus is vulnerable to deleterious effect of alcohol. The research focus on 15 to 18 years age group in which a person only uses alcohol is 16 marijuana and alcohol users 26. The research observed that they have slight different patterns of hippocampus while marijuana abuse/dependence was associated with increased L>R asymmetry and larger left hippocampus volumes. Although MJ +ALC users did not differ from controls in asymmetry, they have used three measures in this study namely Demographics and Psychiatric Assessment, Alcohol and Substance Use, Cognitive Functioning High-resolution MRI data were acquired on a 1.5 Tesla General Electric Signa LX system using a sagittally acquired inversion recovery prepared T1-weighted 3D spiral fast spin-echo sequence (TR = 2000 ms, TE = 16 ms, FOV = 240 mm, voxel dimensions = 0.9375 x 0.9375 x 1.328 mm, 128 continuous slices, acquisition time = 8:36) (Wong, 2000). [3] The research paper by Lindsay M. Squeglia1, Joanna Jacobus, and Susan F. Tapert1 focus on the effects of excessive alcohol intake on the adolescent brain. This research was identified a sizeable cohort of adolescents with Alcohol Use Disorders (AUD) without externalizing or other psychiatric disorders. Furthermore, analyze brain morphology in 64 such adolescents compared to age and gender-matched healthy controls. Magnetic resonance image data were examined by using FSL's FIRST software for sub subcortical volumes and cortical gray matter (GM) was analyzed using Voxel-Based Morphometry (VBM) and regions of interest (ROI) analysis. AUD boys had smaller thalamic and putamen volumes compared with non-drinking boys while AUD girls had larger thalamic and putamen volumes compared to non-drinking girls. VBM exposed a large region of decreased

GM density in AUDs compared to control located in the left lateral frontal, temporal and parietal lobes, extending medially deep into the parietal lobe. Smaller GM volume in this region was presented to examine by using ROI analysis. Hence, this research was lacked in findings of other brain regions, particularly the hippocampus, suggests that reports of smaller brain volumes in adolescent AUDs in the research are a consequence of psychiatric and substance abuse comorbidities.

The traumatic brain injury (TBI) was [8] related to substance-related disorder (SRD) is still debatable, especially in persons with no history of mental disorders at the time of injury. This research was analyzed with the patients in the age of $\geq$18 years who have been diagnosed with TBI and also randomly selected age and gender-matched patients without TBI. The two groups such as case groups and control groups were presented to predict the risk of substance-related disorder. This paper analyzed the overview of structural magnetic resonance imaging and computed tomography findings of direct and indirect alcohol-related toxic effects on the brain. Moreover, in this analysis how the ethanol affected the brain to determine accurate changes in the brain and brain atrophy, osmotic myelinolysis, Marchiafava-Bignami disease and also especially when related to malnutrition which may cause Wernicke encephalopathy. Brain atrophy can be reversible if alcohol abuse was stopped. If not treated, Wernicke encephalopathy can leaded to coma, early diagnosis is important for immediate initiation of thiamine substitution.

This research was enhanced [9] the potential role of TLR4 receptors in both ethanol-induced glial activation and brain damage. The TLR4 was critical for ethanol-induced inflammatory signaling in glial cells since the knockdown of TLR4, by using both small interfering RNA and cells from TLR4-deficient mice, abolished the activation of microtubule-associated protein kinase and nuclear factor-B pathways and the production of inflammatory mediators by astrocytes. The result shows, for the first time, that whereas chronic ethanol intake upregulates the immunoreactive levels of CD11b (microglial marker) and glial fibrillary acidic protein (astrocyte marker) and also increases caspase-3 activity and inducible nitric oxide synthase, COX-2 and cytokine levels interleukin (IL)-1, tumor necrosis factor-IL-6 in the cerebral cortex of female wild-type mice, TLR4 deficiency protects against ethanol-induced glial activation, induction of inflammatory mediators, and apoptosis.

This research has analyzed [10] the effects of excessive alcohol intake on the adolescent brain. This research was identified a sizeable cohort of adolescents with alcohol use disorders (AUD) without externalizing or other psychiatric disorders. Furthermore, analyze brain morphology in 64 such adolescents compared to age and gender matched healthy controls. Magnetic resonance image data were examined by using FSL's FIRST software for subcortical volumes and cortical gray matter (GM) was analyzed using voxel-based morphometry (VBM) and regions of interest (ROI) analysis. AUD boys had smaller thalamic and putamen volumes compared with non-drinking boys while AUD girls had larger thalamic and putamen volumes compared to non-drinking girls. VBM exposed a large region of decreased GM density in AUDs compared to control located in the left lateral frontal, temporal and parietal lobes, extending medially deep into the parietal lobe. Smaller GM volume in this region was presented to examine by using ROI analysis. Hence, this research was lacked in findings of other brain regions, particularly the hippocampus, suggests that reports of smaller brain volumes in adolescent AUDs in the research are a consequence of psychiatric and substance abuse comorbidities

In this research, detailed analysis [11] of the anterior nucleus of thalamus (ANT) in T3 MRI short tau inversion recovery (STIR) images from eight patients undergoing DBS for refractory epilepsy was performed. Coronal and sagittal cross-sectional models of ANT were plotted in the anterior and posterior commissure (AC–PC) coordinate system to analyze individual variation. The MER samples were collected from10 DBS trajectories and 5 patients were analyzed, determine the location of each sample and corrected accordingly to the location of the final DBS electrode and projected to the AC–PC or coordinate system normalized to ANT. The aim of this research was focused on epilepsy anterior nucleus of thalamus (ANT) was visualized in clinically established 3 TMRI and whether ANT was delineated using intraoperative microelectrode recording (MER). Furthermore, this research was especially focused on individual variation in the location of ANT in stereotactic space. This research has demonstrated the role of individual variation in interpretation of MER data by projecting samples onto anterior and posterior commissure (AC-PC) and ANT-normalized Coordinate systems.This research was analyzed [12] how the blood alcohol levels (BAL) were affected in patients with isolated Severe Traumatic Brain Injuries (STBI) (head abbreviated injury scale (AIS) score≥ 3; extracranial AIS score < 3). The low/ No ethanol (ETOH) group was contained patients with negative or low (<0.08 mg/dL) BAL. Patients with BAL $\geq$ 0.08 mg/dL constituted the high ETOH group. Logistic regression was performed to determine whether alcohol levels had an independent association with outcomes. Among patients with isolated still do not seem to be associated with overall injury severity, head injury severity or the occurrence of major morbidities. Similarly, hospital and intensive care unit lengths were not affected by high admission BAL level. The adjusted overall in-hospital mortality was significantly lower in patients presenting with the high BAL after isolated Stbi

This research was deeply analyzed [13] the effects of blood alcohol level (BAL). The acute alcohol intoxication was significantly affected GCS scores even in patients with BALs of 200mgdl^{-1} or higher. When controlling for the effects of injury severity, acute alcohol intoxication was affected by GCS scores only in those patients with BALs greater than 200 mgdl^{-1} who also had intracranial abnormalities detected on CT scan. This research finding was recommended that GCS scores can be interpreted at face value in the vast majority of patients who were intoxicated. Since GCS scores will likely overestimate the severity of brain injury in patients with abnormal head CT scans and BALs greater than 200mgdl^{-1}.This research analyses the search namely MEDLINE [14] on neurologic and cognitive effects of underage drinking. The alcohol utilization of before age 14 years was increased risk of developing alcohol use disorders. Underage drinkers are susceptible to immediate consequences of alcohol use, including blackouts, hangovers and alcohol poisoning and are at elevated risk of neuro degeneration (particularly in regions of the brain responsible for learning and memory), impairments in functional brain activity and the appearance of neurocognitive deficits. Heavy episodic or binge drinking impairs study habits and erodes the development of transitional skills to adulthood.

Underage alcohol has damaged the brain, neurocognitive deficits with implications for learning and intellectual development. Prenatal alcohol exposure [15] had several effects on the developing brain, including damage to selective brain structure. This research analyzed the structural magnetic resonance imaging (MRI) of brain abnormalities in subjects prenatally exposed to alcohol. This research was found how to reduce brain volume and malformations of the corpus callosum. Advanced research was detected the shape, thickness and displacement changes throughout multiple brain regions. The teratogenic effects of alcohol appear to be widespread which affected almost entire brain. the occipital lobe. Future research will explore the relationship between brain structure, cognitive measures, dysmorphology, age and other variables will be valuable for further comprehending the vast effects of prenatal alcohol exposure and for evaluating possible interventions. This research was analyzed [16] the impact of alcohol and how affects the human brain. Alcohol-induced mal-adaptations in the dopaminergic mesolimbic system, abnormal plastic changes in the reward-related brain areas and genetic and epigenetic factors may all contribute to alcohol reinforcement and alcohol addiction. The identification and the understanding of the cellular and molecular mechanisms were involved in ethanol toxicity might contribute to the development of treatments and/or therapeutic agents that could reduce or eliminate the deleterious effects of alcohol on Brain

COMPARISON OF METHODS AND TOOLS USED IN EXAMINING ALCOHOLISM

Authors (Publication years, journal, issue)	Title	Methods/Tool	Data Set/Image Name	Merits	Demerits	Result
Wu and et al, Neural plasticity, 2016.	Traumatic Brain Injury and Substance Related Disorder: A 10-Year Nationwide Cohort Study in Taiwan	TBI (Case and Control Group)	LHID Database	High sensitivity for demonstrating mass effect.	Insensitivity to detect early brain edema	Find the risk of substances related disorder
Geibprasert, and et al, European radiology, 2010.	Alcohol-induced changes in the brain as assessed by MRI and CT	Alcohol dehydrogenase	CT, MRI images	Portable methods	Require continuous recalibration.	Reduce alcohol-related toxic effects on the brain.
Alfonso-Loeches and et al, Journal of Neuroscience, 2010.	Pivotal role of TLR4 receptors in alcohol-induced neuroinflammation and brain damage	Establish the potential role of TLR4	Female Wistar rats (Harlan Ibe´rica) weighing 200–250 g, female C57BL/6 WT mice (Harlan Ibe´rica), and female TLR4-l-KO	Simple model and easy to perform	Marked evaluation of ALT and steatosis	Preventing alcohol induced neuroinflammation brain damage
Fein, G and et al, Psychiatry Research: Neuroimaging, 2013.	Cortical and subcortical volumes in adolescents with alcohol dependence but without substance or psychiatric comorbidities	FSL-VBM analysis	AUD Participants 64 (35 male, 29male, 31 axial, 33 sagittal acquistion)	Able to examine regions that are not anatomically well defined.	Critically depends on accurate normalization.	Reduce the effects of alcohol in adolescence.
Möttönen and et al, NeuroImage: Clinical, 2015.	Defining the anterior nucleus of the thalamus (ANT) as a deep brain stimulation target in refractory epilepsy: delineation using 3 T MRI and intraoperative microelectrode recording	Detailed analysis of anterior nucleus of thalamus (ANT) delineations	186 MER samples, T MRI short tau inversion recovery (STIR) images from eight patients undergoing DBS	Side effects may be reversible.	Highly skilled interdisciplinary team with intensive and frequent monitoring.	Provide clear visualization of a thin white matter lamina between ANT and Other nuclear groups that lack spiking activity.
Talving and et al, Journal of Trauma and Acute Care Surgery, 2010.	Isolated severe traumatic brain injuries: association of blood alcohol levels with the severity of injuries and outcomes	investigate the relationship between blood alcohol levels (BAL) and outcomes in patients with isolated severe	815 patients with isolated severe head injuries BAL and ETOH Groups	Early identification can reduce morbidity and mortality.	Cannot distinguish between prescribed drug and illicit drug use.	Injury Severity Score >25

		traumatic brain injuries (sTBI).				
Lange and et al, Brain injury, 2010.	Effect of blood alcohol level on Glasgow Coma Scale scores following traumatic brain injury	Examine the effects of blood alcohol level (BAL) on GCS scores	475 patients (64% male) who presented to a Level 1 trauma centre following a TBI.	Can detect wider range of drugs.	Can analyse only alcohol use.	GCS scores may be reliably used to evaluate brain injury Severity for the vast majority of intoxicated patients.
Zeigler and et al, Preventive medicine, 2005.	The neurocognitive effects of alcohol on adolescents and college students	MEDLINE search on neurologic and cognitive effects of underage drinking	MEDLINE database	Test the beneficial effects of drugs	Difficult to analyze depression and autism.	The outcome is suggested that the adolescent brain is uniquely Sensitive to alcohol.
Lebel and et al, Neuropsychology review, 2011.	Imaging the impact of prenatal alcohol exposure on the structure of the developing human brain	Prenatal Alcohol Exposure	Magnetic resonance imaging (MRI)	Infer that alcohol causes differences in offspring.	Under how findings apply to humans especially for things that only humans do.	comprehending the vast effects of prenatal alcohol exposure
Alfonso-Loeches and et al, Critical reviews in clinical laboratory sciences, 2011.	Molecular and behavioral aspects of the actions of alcohol on the adult and developing brain	Examine Fetal Alcohol Spectrum disorders (FASD)	MRI images	Easy to isolate effect of variables.	Can only assay single-cell motility.	Reducing Fetal Alcohol Spectrum disorders (FASD)

CONCLUSION

This survey is examined the several brain disorder which are Traumatic Brain Injury (TBI), Substance Related Disorder (SRD), Fetal Alcohol Spectrum disorders (FASD) etc., to reduce the impact of brain injury due to alcohol based on their merits and demerits. In conclusion, this paper is provided a compact and comprehensible survey of some of the important techniques for detection of brain injury due to alcohol. The future research will plan to extend this work as a comparative study of different data mining techniques which have been used rarely in reducing the brain injury due to alcohol.

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