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Pharmaceutical and Non-Pharmaceutical Therapies in Substance Use Disorder

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Abstract

Background*:** The use of substances for recreational and other non-medical purposes is alarming in the society. The trend of substance use globally has been phenomenally startling in the last five decades, and has assumed epidemic and worrisome proportions in recent times. A significant number of these substances are used in the treatment of diverse clinical conditions. ***Objective*:** The work discussed the protocols for rehabilitation and recovery from substance addiction, strategies for prevention, principles underlying the treatment of substance use disorder, and the various therapeutic measures for containing them. ***Method*:** The literature search included databases of google scholar, directory of open access journals, cross reference, pubmed, web of science, etc. Articles on substance abuse and addiction were identified and reviewed for selection. The keywords used in the search were: drug abuse, drug addiction, substance abuse, substance misuse, drug dependence and drug use disorder. There was also a scan of the references of identified journal articles. Only works written in English were extracted. ***Result and Discussion: One hundred and eighteen journal articles and other materials were sourced, while thirty-six articles and other works were identified, extracted and reviewed. Findings show that substance abuse is not immune to any societies. It is a global problem and is responsible for millions of crime and criminality, and their sustenance, as well as many of the deaths, especially violent crimes (e.g., domestic violence, sexual assault, gangsterism, robbery, banditry, insurgency, etc.) in many countries. Substance addiction is preventable and can be treated. No single modality of treatment adequately fits all forms of substance addiction. Relapse frequently occurs during rehabilitation and treatment programmes, and sometimes after many years of abstinence from substance use. ***Conclusion*:** The indiscriminate and inappropriate use of legal and prohibited substances is now a serious public health and social concern. Addiction is the most severe form of substance use disorder. It is a chronic and complex, but treatable disease that affects the human brain structure, function, and behaviour. Prevention reduces the scourge of the menace through public health enlightenment programmes. Several modalities are available for treating substance use disorder, and they include psychotherapy or talk therapy (e.g., counselling, cognitive behavioural therapy, guided self-help, etc.), medical detoxification, pharmacotherapy, and traditional (herbal) remedies. None of these therapeutic approaches works for everyone. In most cases, a combination of these treatment modalities is used during therapy of substance abuse and addiction. Treatment disrupts the cycle of addiction, which is often times prolonged and intensive.

Keywords: Addiction, Evaluation, Detoxification, Treatment Programme, Psychotherapy, Pharmacotherapy.

INTRODUCTION

Substance abuse is a universal public health and social menace, although the problem is more intense and prevalent in some climes than in the others. Substance use disorder has a spectrum, and may be mild, moderate or severe, and typically involves an overwhelming desire to use psychoactive substances, increased tolerance to these substances, and/or withdrawal symptoms (i.e., abstinence syndrome) upon stoppage of substance use.

Substance use disorder significantly impacts human health, relationships, and the general quality of life and living. It can be life threatening, even though, it is preventable and treatable, and therefore, there is the need to seek medical help early to avoid adverse consequences. Substance abuse has ceased to be an urban problem, with substance use disorder (substance abuse and substance addiction) and its attendant negative consequences now found in the semi-urban and our rural communities (Nwonu *et al*., 2022). In the last five decades, there has been an escalation in the incidence of substance abuse amongst people of different age groups and class of the society, especially among the young people in Nigeria and other parts of the world. In Nigeria, 14.3 million people between the ages of 15 and 64 use substances (NBS and CRISA, 2018). About 10.6 million (14.4 %) Nigerians abuse opioids, while 2.4 million youths and adults abuse codeine-based cough syrup, and another 92,000 individuals are using cocaine (NBS and CRISA, 2018). Globally, Nigeria is a top-ranking nation, being one of the highest in the use of non-prescription opioids (e.g., heroin and illicit fentanyl). About 3.0 million people are dependent on substances in Nigeria (NBS and CRISA, 2018). In Africa, country specific incidences in substance use and abuse are scanty, both in the North Africa and Africa south of the Sahara desert. The commonest substances of abuse are cannabis and alcohol, aside the chewing of khat or bushman's tea (a flowering shrub abused for its stimulant property and contains two active ingredients, cathine and cathinone). Khat is probably native or confined to the Northeastern region of Africa (e.g., Ethiopia, Kenya, Sudan and Uganda) and the Arabian peninsula (e.g., Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, United Arab Emirates, Yemen and Southern Iraq). However, more dangerous, dependence-producing and intoxicating agents are now with us, and have been on the increase in both the cities and rural areas of the continent of Africa. These agents include, but not limited to cocaine (a derivative from the coca plant), benzodiazepines (e.g., diazepam, midazolam, etc.), prescription opioids (e.g., codeine and tramadol) and non-prescription opioid (e.g., heroin, also referred to as diamorphine or diacetylmorphine, a semi-synthetic derivative of morphine; fentanyl, a synthetic opioid). The upsurge in the trafficking and availability of these substances, their use and abuse in Africa is fuelled by leadership crises, social upheaval and communal unrest, lack of education, poverty, and high youth unemployment. It has been estimated that in 2012, some 243 million people corresponding to some 5.2 % of the world population between 15-64 years had used an illicit substance, especially cannabis, opioid, cocaine or the amphetamines, at least once in the preceding year (UNODC World Drug Report, 2014). Globally, 35 million people (up from an earlier estimate of 30.5 million) are estimated to suffer from substance use disorder and who require some medical therapy, while one out of seven (1:7) persons receive treatment (UNODC World Drug Report, 2019). Prevention and treatment continue to fall far short of needs in many parts of the world, especially in the correctional facilities, where those incarcerated are vulnerable to substance use and abuse, and face higher risks of contracting HIV/AIDS and hepatitis B or C transmission. Addiction is the most severe form of substance use disorder. It refers to the inability to stop taking a substance, or an activity, even when it causes harm to the individual. Substance addiction is a chronic neurobiochemical disorder that can be a consequence of prescribed medicines (e.g., the excessive use of opioids to ameliorate pain), and may eventuate in fatalities. It exerts a prolonged and powerful influence on the brain which manifests in three distinct ways: craving for the object of addiction, loss of control over its use, and continuing indulgence with it despite the adverse consequences (Harvard Mental Health Letters, 2011). Addiction affects multiple neural circuits, including those involved in reward and motivation, learning and memory, and inhibitory control over behaviour. This is the rationale for referring addiction as a brain disease. Addiction is learnt and stored in the brain as memory (NIDA, 2018). Addiction can be divided into two broad categories. They include substance addiction (e.g., benzodiazepines, cannabis, opioids, nicotine, cocaine, amphetamines, etc.) and behavioural addiction (e.g., food, pornography, masturbation and sex, shopping, gambling, exercise and games, television and movies, and the internet). Substance rehabilitation ensures that the addict confronts substance addiction when it ensues, and quits substance use and abuse in order to circumvent the damaging and negative consequences. Addiction to substances is a complex, but treatable disease that impacts significantly on the neuronal cells, and thus alters the structure and function of the brain, and ultimately changes the behaviour of the addict. No single therapy appropriately addresses all forms of addiction, and in a manifold of cases, combination of treatment is used.

Rehabilitation and Recovery from Substance Use Disorder

Rehabilitation from substance abuse and addiction employs medicines (therapeutic drugs), as well as psychotherapy or talk therapy for individuals addicted to psychoactive substances such as prescription medicines (e.g., benzodiazepines, opioids, etc.) and non-prescription/ recreational or street substances (e.g., amphetamines, cannabis, cocaine, heroin, and alcohol). The rationale for rehabilitation is to ensure that the patient confronts substance addiction, and quit substance use and abuse, so as to avoid the adverse consequences. The recovery from substance addiction takes awhile. It is long, slow, complicated, and a hesitant process in which the influence of these memories (euphoric feeling) declines. About 40 – 60 % of people with substance addiction experience at least one relapse after an initial recovery (Harvard Mental Health Letters, 2011). The rehabilitation process is the most important component

of the substance addiction treatment programme. It is during this period that the underlying causes of addiction are identified and promptly addressed. Substance addiction can pose a serious therapeutic challenge, with or without rehabilitation (Proulx, 2020). Rehabilitation is, therefore, defined as the process of combining, both pharmacological (or prescription medicines) and non-pharmacological (or psychotherapeutic) treatment modalities in substance addiction (Weber, 2015). The goal of rehabilitation for substance abuse is to assist substance addicts learn to live without the in-take of substances (Proulx, 2020). Rehabilitation is designed to bring about restoration and re-integration of an addict into the community where he/she resides (Pillai, 2002). Substance rehabilitation depends on the individual needs of the addict. The protocols for rehabilitation occur in phases and they include:

1. Clinical Evaluation

Every protocol for rehabilitation begins with clinical clerkship (history-taking) and assessment (clinical or physical examination, psychological evaluation, mental health examination and substance tests) by medical personnel, and specially trained in addiction medicine to detect, diagnose, rehabilitate, and to treat substance use disorder. Other team of professionals involved in the care of substance abusers aside the physicians and mental health physicians (psychiatrists) are: psychologists, psychotherapists and counsellors, and the psychiatric nurses. Clinical evaluation examines the individual needs, degree of addiction, and the health status of the addict (Elkins, 2020). It enables the physician to develop a personalised treatment programme. Assessment of substance addiction is a critical component of the rehabilitation process, as persons with substance addiction are highly secretive (Proulx, 2020), and may not readily volunteer information regarding their involvement in substances and their substance life. A lot of psychology and tactfulness is needed in order to make the addict to be open about his/her life of substances.

There are variations in symptoms of substance use disorder depending on the substance, but typical symptoms include: intense urge for the substance (cravings/ obsessions), failure to meet family obligations and work responsibilities, incremental need of substance to achieve the same effect, avoiding social gatherings or skipping recreational activities, withdrawal syndrome in an attempt to discontinue substance, using substance despite knowing the harmful effects on health and relationships, spending lengthy hours procuring, using or recovering from substance use, and taking hazardous risks such as casual/ unprotected sex, driving under the influence of alcohol or other mind-altering substances. Findings on physical examination will depend on the specific substance that is abused, frequency of use, and the duration since the last consumption of substance. Clinical signs include weight loss, fatigue or tiredness, red eyes, poor personal and environmental hygiene, depression/anxiety/sleep disorders, changes in heart rate and blood pressure, and abnormalities in the laboratory tests (Johns Hopkins Medicine, 2025).

Substance testing is done primarily to screen individuals systematically or randomly for evidence of mono- or poly-substance use with abuse potential (O'Malley and O'Malley, 2022). The categories or groups that can be screened include students, athletes, footballers, and prisoners. Others include persons applying for certain jobs (e.g., pilots, commercial truck / long-distance drivers), people involved in work-place or occupational accidents, drivers of boat and vehicular accidents, persons that have attempted suicide, people in substance abuse treatment programme, individuals in court-ordered treatment programme requiring abstinence to monitor compliance/ adherence, and military personnel (O'Malley and O'Malley, 2022).

Testing for substances vary depending on the type of substance being investigated and the categories of specimen/ samples that are collected. Samples used for laboratory analysis include blood (e.g., whole blood, plasma, and serum), breath, hair, meconium, saliva (oral fluid), sweat, body tissues, and urine. Laboratory investigations are the most reliable assay for confirming substance use and abuse. A 5-panel substance assay investigates for commonly abused prescription medicines and illicit substances (but, not alcohol) such as amphetamines – methamphetamine, 3, 4 - methylenedioxymethamphetamine (ecstasy); phencyclidine; cocaine; opioids; marijuana (Korolevich, 2023). Urine testing is the most common assay for detecting substances of abuse or their metabolites, because it is non-invasive, fast, and can qualitatively detect a wide range of substances (e.g., alcohol, benzodiazepines, opioids, cocaine and marijuana). Submission of wrong specimen from other patients can lead to false negative results, which can be avoided by direct observation of specimen collection in patients, while properly sealing and labelling same. False positive results can be due to ingestion of prescription medicines and non-prescription substances, including the consumption of some foods. The poppy plant, especially the seeds is associated with false positivity for opioids. Certain substances such as pseudoephedrine, TCA, and antipsychotics (e.g., quetiapine) give false positive results with the amphetamines. In addition, ibuprofen (a NSAID) produces false positive results with marijuana. In the screening for neuropsychostimulants (e.g., cocaine), benzoylecgonine, a primary metabolite of cocaine is the agent to be detected in the analyte (O'Malley and O'Malley, 2022). The window of detection of substances in the body depends on the frequency and amount (dose) of substance(s) consumed, but it generally about 1- 4 days post intake for most substances. Haematological (blood) analysis is rarely performed because its invasiveness and shorter window

of detection. Blood test can, however, be used to detect the presence of alcohol in the human blood. Hair follicle screening provides the longest window of detection (O'Malley and O'Malley, 2022; Cleveland Clinic, 2025), depending on the anatomical site of the harvest specimen hair follicle (e.g., 3-months for scalp hair and 12-months for body hair). The breath test detects alcohol consumption in what is described as breath alcohol concentration (BrAC), and is currently under clinical trial for the detection of cocaine (Cleveland Clinic, 2025).

2. Medical Detoxification

Detoxification is often referred to as the first stage of treatment. It is the elimination of substances from the body, with the objective of managing the acute and potentially dangerous physiological effects of quitting substance use (NIDA, 2018). It enables the abuser to stop taking the substance as quickly and as safely as possible. Detoxification on its own cannot solve the psychological, social, and behavioural problems associated with substance addiction. As a consequence, it does not typically produce lasting behavioural changes necessary for recovery (NIDA, 2018). All addicts require close monitoring and supervision by clinicians during the detoxification programme, because of the unpalatable withdrawal symptoms that may ensue as substances and their metabolites are eliminated from the body (Elkins, 2020; Proulx, 2020). During medical detoxification, addicts are strictly monitored by physicians, and medications may be required to mitigate the intensity or treat any untoward reactions arising from the detoxifying substances.

3. Psychotherapy or Talk Therapy

Talk therapy or psychological treatment is of immense critical importance in the rehabilitation programme. Addiction issues that stem from underlying mental and emotional conditions are handled by counsellors, so as to establish a base for sobriety (i.e., not intoxicated by substances) in the future. After determining the cause of addiction, counsellors and psychotherapists help substance addicts adapt new thoughts, patterns, and behaviours that can change outcomes. Behavioural therapy can improve the effectiveness of medications and help individuals adhere to treatment regimens for a reasonable length of time (NIDA, 2006). CBT is a psychological treatment technique for substance use disorder, and has been demonstrated to be effective more than other forms of psychological therapy. It helps patients recognise, avoid, and cope with any situations in which they are most susceptible to abuse substances by modifying the attitudes and behaviours of addicts (NIDA, 2006).

4. Post-Care and Recovery

Participation of addicts in a rehabilitation programme from inception to conclusion is not the final or end-stage of the rehabilitation process. Recovery from substance addiction is a life-long process associated with a multiplicity of challenges, such as resisting compulsion (or cravings) and triggers to use substances again. Majority of the relapses occur during this phase (Proulx, 2020). The recovery process continues with follow-up programmes, sober living facilities, transitional houses, support group attendance, job or life skills acquisition, and then continued talk therapy (Elkins, 2020).

PREVENTION OF SUBSTANCE USE DISORDER

Addiction is a chronic brain disorder which can be prevented or treated if it develops (Eserian, 2013). It can have a devastating effect if allowed to fester or the individual addict is left untreated. The main objective of prevention is the creation of social conditions which will allow the individual addict to develop a lifestyle that prevents him/her from further consumption of substances (Penninckx, 2013). Prevention programmes should be implemented at various levels, which influence the behaviour and values of children and young people. Educational programmes in schools, communities and at the family level, as well as the media (e.g., radio and television) and religious centres (e.g., churches and mosques) can help prevent the first usage of a substance ((Penninckx, 2013). Avoiding illicit substances and following the instructions by medical professionals for prescription medicines can also prevent addiction. While it is practically impossible to prevent people from using substances, a great deal can still be done to stop the abuse/misuse of substances. The measures aimed at preventing substance abuse include the following:

1. Understanding the Genesis of Substance Abuse

Substance abuse begins by:

i. Using addictive substances (whether illicit or prescribed) for recreational purposes.
ii. Seeking out intoxication each time they are used.
iii. Abusing or misusing prescription medicines.

2. Avoidance of Peer Pressure

Overcoming peer group influence, and wanting-to-belong syndrome among the teens from their friends and close allies will significantly reduce exposure to and the abuse of substances (Morgan, 2001). No one likes to be left out, and teens and some adults, too find themselves doing things they normally would not do, just to fit in. Teens should prepare a good excuse or plan ahead of time, to resist or keep away from negative influencers, who may entice them with illicit substances, which may eventually be detrimental to their health and well being (NIDA, 2014).

3. Reduction of Life Pressure

Human beings are constantly faced with the challenges and stresses of everyday life. Work and family pressures can be enormously overwhelming, and sufficient to tilt the minds of certain individuals to substance taking as a reward or escape route. To

circumvent this, we need to look for ways of unwinding and coping with stress and pressures of life, and this may include exercises/ sporting activities, reading (newspapers, magazines, books, and novels), volunteering, creating something novel, singing and dancing, etc. Empirical findings have shown that anything positive and relaxing, helps to take the mind off illicit or mind-altering substances, and thus helps to relieve individuals from stress.

4. Seeking Help for Mental Illness

There is a strong correlation between mental illness and substance abuse. Individuals with mental illness may turn to substances as a way of escape from their problems. Those suffering from mental illnesses, such as anxiety, depression or post-traumatic stress disorder should seek medical assistance and treatment as early as possible, before it culminates in substance abuse (NIDA, 2014).

5. Examining the Risk Factors

Knowledge of the risk factors (both genetic and environmental) for substance abuse helps to overcome them (NIDA, 2014). A history of substance abuse in the family, living in a social setting that eulogises substance abuse and/or family life that models substance abuse can be risk factors. Other risk factors that can be a trigger for substance use include poor school performance, poor/ excessive parenting, jilted-love, spousal abandonment (e.g., separation or divorce), loss of job (down/right-sizing of workers' or compulsory retirement), loss of money from fraudsters or bad financial news, bereavement (e.g., death of a close relative or a bread-winner in the family), etc. (Nwonu *et al*., 2022).

6. Maintenance of a Balanced Life

Some people turn to substances when life is not working well, or when there is lack of peace and harmony in the home or when someone is uncertain about the direction of one's life. Under these circumstances, what is needed is a healthy lifestyle; considering our relationships, work, exercising and eating right (NIDA, 2014; Torres-Rodriquez, 2017). A balanced life involves examining the fitness and general health, protection of mental and emotional health, as well as stress reduction (NIDA, 2014; Torres-Rodriquez, 2017).

7. Stopping the Cultivation and Trafficking of Illicit Substances

The cultivation, trafficking and availability of illegal substances can be stopped or at least minimised through a coordinated effort aimed at disrupting the networks and routes involved in the production, processing, transport, marketing and use of illicit substances. These measures will successfully and effectively control illicit substance activities and mitigate its negative consequences to the society (Drug-Free ASEAN, 2000). The strategies employed to disrupt the trafficking of substances include a significant and sustainable reductions in:

i. Illicit crop cultivation (e.g., cannabis, opium poppy, coca plant, etc.).
ii. Illicit manufacturing and trafficking of substances and substance-related crimes.
iii. The prevalence of illicit substance use.

Other measures that will stem the current alarming trajectory of illegal substance use are:

i. Occupation change and the provision of sustainable livelihood to farmers' previously engaged in the cultivation of illicit crops. This will drastically decrease the availability and sale of these illegal substances.
ii. Elimination of syndicates involved in the clandestine production and trafficking of illicit substances.
iii. Elimination of diversion and smuggling of raw or starting materials and their precursor chemicals.
iv. Enhancement of cross-border patrols and transnational law enforcement collaboration and cooperation.

Treatment Programmes for Substance Use Disorder

Each individual addict has a different treatment programme designed to meet his/her unique needs and situations. In other words, there is individualisation of therapy. Following the discharge of an addict from a RT facility, there is the need to continue follow-up, though on an out-patient basis, as well as post-care programmes. These measures will help to minimise the risk of relapse, which frequently occurs during this period (NIDA, 2018). These treatment programmes ensure that the addicts are properly integrated at every stage in the treatment process. There are two types of treatment programmes:

i. In-patient Treatment (Residential)

Residential or hospital-based treatment offers the best approach to rehabilitation, especially for chronic addicts and all those with co-occurring mental or behavioural disorder. In this modality of treatment, patients remain in the health facility free-of-drugs, and attended to without any interruptions to medical or paramedical care. RT is of two categories: short-term RT and long-term RT.

a). Short-Term RT:

The approach provides an intensive, but relatively snappy treatment, usually for about 3-6 weeks. Short-term RT is hinged on the original in-patient model of therapy, which has long been revised (NIDA, 2018). It focuses on detoxification and preparing the addict for prolonged stay within a therapeutic community through adequate counselling (Felman, 2018). This treatment modality was initially and exclusively reserved for individuals addicted to alcohol, but with time, other forms of substance use disorder were incorporated into

the scheme, especially cocaine and other psychoactive substances.

b). Long-Term RT:

This type of treatment takes place outside a hospital setting, in what is known as therapeutic community. Treatment lasts between 6-12 months, and there is no interruptions to healthcare in the community. The objective of the scheme is to re-socialise and re-integrate the individual into the community of the addicts, and by extension the larger society. This will ensure that the individual leads a quality, responsible and a socially productive life. Other challenges and needs of the addicts are also addressed in the community, aside the primary problem of substance addiction.

ii. Out-Patient Treatment (Non-Residential)

Out-patient treatment is a non-residential, out-of-hospital rehabilitation modality for substance addiction, which is equally effective as the in-patient therapeutic approach. In this form of treatment, patients come from home for treatment while engaging in other activities to care for the family. The draw-back to this therapeutic modality is that you cannot vouch that a patient is not having access to psychoactive substances, and may lead to relapse early in the course of therapy.

Treatment Modalities for Substance Use Disorder

Addiction treatment is individualised and is based on the substances involved, as well as associated psychosocial issues (e.g., personality traits and psychopathology) of the addict. Mechanistic and clinical understanding of the substances or a combination of substances that is ingested, injected, snorted or otherwise by the addict are critical to rational and effective therapy (O' Brien, 2013). Medical therapy can be used to help restore normal brain function and to prevent relapse, and in turn, reduce obsessions and cravings throughout the treatment process (NIDA, 2006). The identification of substance use as behaviour that is reinforced by substances has contributed greatly to the understanding and treatment of addiction (Panlilio and Goldberg, 2007). The method of treatment of substance addiction is not a one-size-fits-all. This implies that there is no single or combination of substance therapy and/or behavioural modification that effectively addresses all forms of addiction (NIDA, 2009; Luscher, 2015). However, addiction can still be reversed. There are different options for different types of addiction, and different treatment process for different individuals (Elkins, 2020). Pharmacological intervention may be lifesaving in times of overdose or intoxication, and at all stages of the disease (Luscher, 2015). Substance addiction can be treated through medical detoxification (the process whereby a substance leaves or is being removed from the body), behavioural therapies and substance-assisted therapies. In many cases, a combination of therapies is used. The whole essence of behavioural therapy is to identify and change potentially self-destructive or unhealthy behaviours (i.e., change an individual's thinking and behavioural patterns to a healthier one), since all human behaviours are learnt, and that adverse and unhealthy behaviours can be changed (Gotter, 2018). Treatment is directed towards thoughts and beliefs of individuals, and how they influence their actions and moods. Behavioural therapies can help motivate people to participate in substance treatment; offer strategies for coping with substance cravings; teach ways to avoid substances and prevent relapse; and help individuals deal with relapse when it occurs (NIDA, 2009). Behavioural therapies can also help people improve communication, relationships, and parenting skills, as well as family dynamics (NIDA, 2009). Medications can be given to help with withdrawal and other symptoms of addiction during treatment. Untreated substance abuse and addiction add significant costs to families and communities, including those related to violence and property crimes, correctional centre expenses, court and criminal costs, intensive care visits, healthcare utilisation, child abuse and neglect, lost child support, foster care and welfare costs, reduced productivity, and unemployment (NIDA, 2006).

Goals of Treatment for Substance Use Disorder

i. Reduce harm to the abusers *via* needle exchange schemes and health information.
ii. Minimise dangers to the individual and to the society at large.
iii. Encourage abstinence from substance use.
iv. Improve the quality of life and the prevention of short-term and long-term adverse health consequences.
v. Psychological support from substance abuse agencies.

Principles of Treatment of Substance Use Disorder

Substance addiction therapy varies depending on the medication type and patient's characteristics. Combination therapy and other services are needed in order to achieve the most desired result in any treatment programmes (NIDA, 2018).

1. Substance addiction is a complex but treatable disease that affects human brain structure, function and behaviour.
2. No single pharmacological or non-pharmacological therapy effectively addresses all forms of addiction.
3. Treatment must be readily available, so that addicts can be worked upon early during presentation at the health facility.
4. Treatment must be holistic (i.e., it must take care of the various needs of the individual, and not just the substance use disorder).
5. It is important that they remain in the treatment facility for a reasonable length of time (at least 3-months).

6. Behavioural therapies should involve the individual addict, the family or group counselling.

The foci of these modalities of treatment are different, but may include the following:

a) Motivation of addicts to change.
b) Provision of incentives for abstinence from substances.
c) Skills acquisition so as to resist the urge for substance consumption.
d) Substituting substance-use activities with those ones that are constructive and rewarding.
e) Improvement in problem-solving skills.
f) Enhancement of inter-personal relationships.

7. Medication therapy is a critical component of treatment, which can be combined with counselling and behavioural therapy.
8. Treatment plan and services for the addict must be regularly evaluated and modified as situation may warrant, so as, to meet the changing needs of the individual.
9. Addicts may have a co-occurring mental illness, and have to be properly evaluated and treated pharmacologically.
10. Medical detoxification is the earliest form of addiction therapy, and may not alter the course of chronic abuse of substances, hence the need to continue medication therapy post detoxification.
11. Treatment must not be voluntary in order to be effective. Persuasions, enticements, and sanctions may be employed to enhance enrollment of individuals into the treatment programme.
12. Substance use by addicts during treatment programme must be closely monitored to prevent a relapse.
13. HIV, hepatitis B and C, tuberculosis and other infectious diseases investigations must be conducted as part of the treatment programme, as well as targeted risk-reduction counselling.

Pharmacological Approaches to the Treatment of Substance Use Disorder

1. Substitution Therapies

Substitution (i.e., replacement) refers to a conscious motivated choice to use a particular legal or illegal substance, due to perceptions of pharmacoeconomics (cost), availability, safety, legality, substance characteristics, and substance attributes. Substitution is a potential risk to substance abusers, especially when a replacement of higher potency and toxicity is used (Shapira *et al*., 2020). An agonist molecule that acts at the same receptor as the abused substance has been used to treat opioid and nicotine dependence in abusers and addicts (Luscher, 2015). Treatment medications, such as methadone, buprenorphine (opioid agonists), and naltrexone (opioid antagonists), are available for individuals addicted to opioids, while nicotine preparations (in the form of transdermal patches, gums, lozenges and nasal sprays) and agents, such as varenicline and bupropion are available for individuals addicted to tobacco (NIDA, 2009). In substitution therapy, a long-acting agent is replaced with one that acts or is absorbed more slowly, thus avoiding the bolus obtained by smoking, and reducing acute withdrawal symptoms (Luscher, 2015). It is generally believed that substitution decreases the risk associated with health, reduces substance-associated crime and better social integration, but does not eliminate dependence, as it persists despite replacement.

2. Use of Pharmacological Antagonists

Methadone (synthetic opioid) and buprenorphine (semi-synthetic derivative of thebaine, an opiate) are effective agents for the treatment of opioid addiction. They act on the same target in the brain as heroin and morphine to block the substance effects, suppress withdrawal symptoms, and relieve craving for the substances (NIDA, 2006). This helps patients to disengage from substance-seeking and related criminal behaviour, and be more receptive to behavioural treatments (NIDA, 2006). Naltrexone is a partial agonist and antagonist at opioid receptor, and has been medically approved for opioid and alcohol addiction (NIDA, 2009). It is a long-term synthetic opioid receptor antagonist, which abolishes all effects related to opiates and opioid agents, including euphoria. Medical detoxification of an abuser is required to use naltrexone, so as to prevent opioid abstinence syndrome.

3. Alcohol Dependence

Alcohol use disorder (i.e., alcohol abuse and alcohol addiction) is considered a major public health problem, and is ranked as the third leading cause of death and disability the world over (Samokhvalov *et al*., 2010; WHO, 2011; WHO, 2022). Alcohol use disorder is often referred to as alcoholism. The harmful use of alcohol has implication (as a causal factor) in over 200 disease and injury conditions (WHO, 2022). Disulfiram or antabuse (an irreversible aldehyde dehydrogenase inhibitor), acamprosate (NMDA receptor antagonist), naltrexone (opioid receptor antagonist), topiramate (a multi-mechanism antiseizure medication), etc. are agents used for treating alcohol dependence, which commonly co-occurs with other substance addictions (NIDA, 2009). Disulfiram is clinically employed in alcohol withdrawal programme as a therapeutic adjunct in order to prevent alcohol consumption. There must not be any traces of alcohol in the body, as presence of alcohol leads to the accumulation of alcohol dehydrogenase in the body, and may lead to unpalatable adverse reactions (e.g., headaches, nausea, palpitations), and possibly resulting in arrhythmias, hypotension, and circulatory collapse (Luscher, 2015). Acamprosate is used in the maintenance of abstinence from alcohol. NMDA receptor has been shown to proliferate (up-regulation of NMDA receptors) in alcoholics. The blockade of this receptor decreases

abstinence syndrome during alcohol withdrawal programmes. Sedative-Hypnotics may be helpful in reducing withdrawal syndrome in alcoholics. Chlormethiazole is a hypnosedative and anxiolytic agent, and a potent inhibitor of alcohol-inducible cyt. P_{450} family of enzymes (e.g., CYP2E1, CYP2B6, and CYP2A6) that biologically transform (metabolise) alcohol, and this activity has been demonstrated, both experimentally, in the animal models (e.g., rat liver) and clinically, in human experimental studies (Gebhardt *et al*., 1997). Chlormethiazole's metabolic action inhibits aldehyde dehydrogenase, slows the elimination of alcohol, and decreases acute withdrawal symptoms in alcohol addicts (Gebhardt *et al*., 1997). Long-acting benzodiazepines, such as chlordiazepoxide may be employed in ameliorating withdrawal symptoms, but it is prone to dependence (Luscher, 2015).

4. Traditional Remedies

Natural medicine has become an integral and popular form of healthcare worldwide (Nwonu *et al*., 2019). Plant-based (phyto- or herbal) medicines have been the core of traditional medicine, including the treatment of human and animal ailments from the beginning of times. From the dawn of industrial revolution, drugs and medicines have been processed from plants. Phytotherapy and acupuncture can complement medication therapy, although as therapeutic adjuncts. These will help to limit the dose of administered medications, and thus lower their side effects profile (Lu *et al*., 2009). Acupuncture has demonstrated evidence for clinical efficacy and neurobiological mechanisms in opiate withdrawal. However, it showed poor efficacy for alcohol and nicotine withdrawal or relapse prevention. In clinical studies with cocaine, acupuncture failed to show clinical efficacy in decreasing withdrawal symptoms and preventing relapse among addicts (Lu *et al*., 2009). Herbal medicines (in the form of plant extracts or their active principles) have been used for detoxification and in the therapy of substance addiction and abstinence syndrome. Botanicals that have shown promise in the treatment of substance addiction, include ginseng (morphine addiction), passion flower, nigella satvia (withdrawal symptoms secondary to opiate addiction), caulis sinomenii (morphine addiction), chamomile, berberis (withdrawal symptoms of morphine addiction), camellia sinensis - epigallocatechin gallate (morphine addiction), etc. Alchornea laxiflora extracts may be beneficial in the adjunctive treatment of anxiety and insomnia associated with opiate abstinence or dose reduction during substance addiction treatment programme (Nwonu *et al*., 2018). The extracts of these plants are most effective when concurrently used with other therapeutic measures. However, there is a drawback to the co-administration of herbal medicinal products with prescribed (pharmaceutical) medicines, which is the development of adverse reactions, such as herb-drug interactions. Common among these interactions are the elevation of liver enzymes (e.g., transaminases) due to hepatic cell injury, gastrointestinal upset (e.g., vomiting, diarrhea, constipation, etc.) and renal tissue damage (nephrotoxicity).

Most people with severe substance addiction are poly-substance users and require treatment for all substances abused. Even combined alcohol and tobacco use has proven amenable to concurrent treatment for both substances (NIDA, 2009). Psychoactive medicines, such as antidepressants, anti-anxiety agents, mood stabilizers, and antipsychotic medications, may be critical for successful treatment when patients have co-occurring mental disorders, such as depression, anxiety disorders (including post-traumatic stress disorder), bipolar disorder, or schizophrenia (NIDA, 2009).

CONCLUSIONS

Substance addiction is a preventable and treatable chronic brain disorder. Most people with severe addiction are poly-substance users and require treatment for all substances abused. The first step in the treatment of substance use disorder is the withdrawal of the abused substance(s). Medical therapy can be used to help restore normal brain function and to prevent relapse, and in turn reduce obsessions and cravings throughout the rehabilitation and treatment processes. Addiction is learnt and stored in the brain as memory. The recovery from substance addiction is long, slow, complicated, and a hesitant process in which the influence of these memories wane. It will be worthwhile to develop and promote programmes for the prevention of addiction, stemming the availability of substances at all levels, from the combat against organised crime to decreased supply in the streets, as well as the fight against all forms of substance-related crime and criminality. Prevention of substance use reduces the scourge of the menace through public health enlightenment programmes in schools, communities, market places, churches and mosques, as well as radio and television. These noble strategies can discourage teenagers from early or first usage of substances. Other life transformation initiatives through the provision of other means of livelihood to enable farmers abandon cannabis, opium poppy and coca plants bush cultivation and join the licit economy, and earn a living outside psychoactive substances. These measures will significantly reduce illicit substance production, availability and trade.

Abbreviations

CBT: Cognitive Behavioural Therapy
NSAID: Non-Steroidal Antiinflammatory Drugs
RT: Residential Treatment
TCA: Tricyclic Antidepressants

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