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NEW TREATMENT APPROACHES FOR THE MANAGEMENT OF ALZHEIMER'S DISEASE

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ABSTRACT

This assessment is mainly concerned with the new treatment approaches for the management of Alzheimer's disease and how these procedures can be beneficial for patients suffering from such diseases. With various other brain diseases, the number of Alzheimer's disease cases is also increasing day by day in the world. So, it has become very important to be aware of the various new methods for the treatment of Alzheimer's disease. The new treatment methods that are been used for the treatment of such brain disorders are found to be highly beneficial, as various new therapies and methods are being discovered for the treatment of such brain diseases. The various medications that are being used for the treatment of such diseases are beneficial only when taken under proper guidance and amount. Various precautions are very necessary during the treatment of such diseases, which can be helpful in the treatment. These treatment procedures may vary from person to person depending on their age factor and health.

INTRODUCTION

With the advancement and modernization of the world, people are also becoming more prone to various diseases and problems [1]. Diseases are caused by several factors such as lack of proper environment, lack of proper hygiene, genetic disorder, etc [2]. To cure such diseases and problems scientists and doctors are highly benefitted due to the technological advancement that has taken place in the sector of medical science and research [3]. The day-to-day discoveries made by the doctors are helping the patients to cure properly at a higher pace [4]. Doctors now a days are also focusing on the treatment of the patient through psychological ways as many diseases have a direct or indirect

effect on our brain. And as we all know that our brain is one of the most important parts of the human body, because all the functionality and responses of our body are controlled by our brain, so it becomes very essential for a person to keep his/her brain healthy [5].

As we all know that today's modern world is full of stress and mental pressure, due to the challenges and complications that are faced by people in their everyday lives. The human brain is also considered one of the most sensitive parts of the body as it consists of billions of neurons and various glands that are responsible for the proper growth and function of the body.

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Various brain treatments require the use of very hi-tech machines which can only be properly operated by highly experienced doctors. With the increase in brain-related issues in the world, it has become very challenging for doctors to provide these patients with proper treatment on time [6].

Many environmental factors and genetic mutations are also responsible for such brain diseases, such diseases also arise due to various social and economic factors, which many times also affect their brain and result in various brain-related problems [7]. As lead is highly responsible for damaging the neurological system of the brain, it can even kill a person [8].

Benefit of new treatment approaches for the treatment of Alzheimer's disease

Various new technologies and methods that are developed for the treatment of Alzheimer's disease are highly beneficial in controlling and lowering the adverse effects caused by this disease. The various new Treatment Approaches that are being developed can also help us in completely curing such diseases in the near future. The New Treatment Approaches are highly modified and much more effective in less time in comparison to traditional approaches. The new approaches also help the doctors to analyse the patient's brain response to the treatment in a more effective way. These new methods of treatment are also helping the doctors to track the behaviour changes and symptoms of the patient in a much more precise manner. Alzheimer's being a brain disease, can create many bad consequences for the suffers and the people around them.

Alzheimer's disease

Alzheimer's is one of the neurological disorders which can also be considered a brain disorder that gradually damages the brain's memories and expertise which results in harming the functionality of the body. The main cause behind this disease is the unusual formation of proteins outside and within the brain cells. Amyloid and tau are one of the main proteins in such disorders that form the plaques and tangles around the brain cells. Alzheimer's disease leads to a shrinking of the brain size. This brain disorder is mostly experienced by old-aged people but can also be found in people between the ages of 30 to 40 years old. The stage in which people under the age of 65 suffer from this disorder is called early-onset Alzheimer disease.

Some of the early symptoms of the person suffering from Alzheimer's are as follows:

- Gradual loss of the memories
- Sudden change in anxiety and anger
- Lack of making proper decisions
- Forgetting things in a short period
- Sudden change in mood and behaviour

The advancement in technology had made it easier to regulate the problems caused by such brain disorders, as they cannot be fully cured. But the new treatment method and medicines had made it a lot easier to regulate the symptoms of such disease. As the people who are most affected by this disease are the old age people, those are mostly the people that are above the age of 65. Being old these people require intensive care and assessment on regular bases, and as we all know that the brain is considered to be the most important organ of our body, so it becomes more challenging for the people to take care of old age person that is affected with such brain disorders. However, the advancement in technology had given birth to various therapies and methods which are somehow beneficial during the treatment of such people. But various other factors are needed to be kept in mind during the treatment of such patients, as in many cases the patients can become violent due to such disorder and it becomes very to control such patients. In such cases, several psychological methods can be helpful to control such patients, which is majorly dependent on the surrounding environment in which they are kept. A peaceful and nature-friendly environment would be more suitable for such patients in comparison to a loud and noisy environment. It will help these patients to enhance their brain activities and to develop a strong immune system, which can help them to regulate or lower the effect of the disease. The nature-friendly environment also helps to increase the pace of the treatment of these patients positively and also helps them to fill with serenity and peace.

The new medication method that is currently useful in the treatment of Alzheimer's disease is the Aducanumab, it is a medication process that mainly targets lowering down the effect of beta-Amyloid which in return helps to lower down the plaques caused by this Amyloid protein, which is one of the main causes of this disorder.

There are mostly 3 types of medicines that are used to treat such disorders which are.

- Donepezil
- Galantamine
- Rivastigmine

Pathological mechanism in Alzheimer's disease**i) Oxidative Stress**

The consumption of oxygen leads to the generation of free radicals which are reactive nitrogen species (RNS) and reactive oxygen species (ROS) that includes Superoxide ions and hydroxyl radicals. Oxidative damage is the initial change that is observed in an AD patient. According to research oxidative stress can lead to hyper-phosphorylation and polymerization of tau protein [9]

ii) Neuro-inflammation

It is a procedure that helps to activate the natural immunity in the brain. Neuro-inflammation helps to protect our central nervous system from various infections, injuries, and diseases. The transgenic animal model has been able to reveal the enhancement of neuro-inflammation that takes place around amyloid plaques [10]

iii) Metal Toxicity

Iron, zinc, and copper are the essential elements for neuronal functioning. After a certain age, the accumulation of metal ions begins to take place in the brain, further causing neuro-degeneration. The therapy of Metal chelation is used in such cases, in which the treatment is done by binding and removing the metal ions, which is very beneficial to also treat oxidative stress [11]

Role of Drugs on Treatment of Alzheimer's disease

As mentioned above this brain disorder can only be controlled and treated, as this disease is not completely curable. In such cases, drugs play a major role in regulating the symptoms and the problems that are caused by this disorder. As these drugs help to directly target the root cause of the problem arising, and they provide relief to the patients by inhibiting the effect caused by the disease. These drugs are various essential for the treatment of such brain disorders, as they help to regulate brain activities and to overcome the damage caused to the brain of these patients by such diseases. In the case of Alzheimer's, the most significant role is played by drugs as they help lower and regulate the effects and problems caused by this disorder.

There are 2 types of drugs that are used for the treatment of this disorder, which are:

- Cholinesterase inhibitors
- Memantine

These drugs are mainly recommended for certain Alzheimer's phases. Alzheimer's is categorized into 3 main phases which are mild, moderate, and severe; these phases are detected by analysing symptoms and problems intensity. The response toward these drugs may differ from person to person, depending on the person's body response toward the drug. These drugs are prescribed to be used under the guidance of experts as improper use of these drugs can cause harm to the person [12]

Cholinesterase inhibitors

Alzheimer's causes damage to the brain by dropping the amount of acetylcholine, which is a chemical messenger that is responsible for regulating the thinking process, awareness, and analysis functions executed, by the brain. Cholinesterase drug increases the quantity of acetylcholine, which helps to avoid malfunctioning of the brain. These drugs are only effective for a short period, as their ability lowers with the progression of the disease. These drugs may also have some ill effects on the body, so these drugs should be recommended under the guidance of an expert. But these drugs are helpful up to some extent when taken in a controlled way. As these drugs are very strong and are only effective if taken in the proper dosage, the improper dose of these drugs may have bad effects on the patient's brain, as an excessive dose of these drugs can also be fatal to the patient's brain and body. These drugs should only be taken by the patients after being prescribed by doctors and experts, as mentioned above these can have various ill effects if not taken with a proper prescription. There are around 3 types of these inhibitors that are mainly used, which are, Donepezil, Galantamine, and Rivastigmine [13]

Memantine

This drug is used in case of moderate or severe levels of Alzheimer's disease. This drug's functionality is to control the process of glutamate, a message bearer chemical that helps to control the brain's functionality, which involves thought processing and memorizing things [14]

Problems faced during the treatment of Alzheimer's disease:

Various challenges are faced during the treatment of Alzheimer's disease.

- Insufficient understanding & information about the disease
- Lack of money for proper treatment
- Difficulty in identifying and locating the disease
- Lack of proper equipment and facilities

The main problem that is faced during the treatment of Alzheimer's is the lack of money, due to which various other problems arise such as lack of proper treatment, which results in severe damage to the person's brain and total functionality of the body. Proper treatment of such types of brain disorders requires a proper amount of money and care. This disease is a brain disease that directly affects the neurological pathway of the person. And an improper treatment leads to behaviour change in that patient, which can sometimes be harmful to the person and the other people around that person. As this disease may lead to psychotic disorder, which, in severe cases can drastically affect the psychological behaviour of the person, such as the person can experience problems like hallucinations and delusions. These hallucinations create a false belief among the patients which highly plays with their minds, many at times it can produce a disastrous effect on the patients. Because of this, the patients are unable to follow proper medication procedures which further degrade their progress and worsen the effect of the disorder.

The other problem faced in such brain disorder is the improper dosage of the drug, that is used to treat this disease, as the lower dosage will have less effect on the person, whereas a high dosage can have side effects on the person, so a person needs to have a regulated and proper dosage of these drugs for proper results. These drugs are beneficial only when taken in a proper dose according to a doctor-prescription on regular basis. As different drugs are given to the patient depending on his/her stage of the disease they are suffering from. These drugs do not completely cure the disease but they help to control the effect of the disease, so it becomes important for such patients to be on regular medication. A lack of regular medication can result in degrading the treatment progress and can create instability in the patient's brain, and make the patient suffer more due to problems generated by that disease. Old-age people suffering from such diseases mostly have a weak immune system that makes them prone to more damage to the brain in comparison to the adults suffering from such diseases. So, it becomes very essential for old age patients to have proper medication and check-ups regularly, as they also require intensive care during their treatment because they lose their memorizing power easily. One of the major problems that arise during the treatment of Alzheimer's disease is the improper management by the Hospitals and Medicare. During the treatment procedure patients are kept apart from their relatives and friends in an isolation for

a long time, which sometimes results in psychological behavioural changes in these patients, as these patients are kept in an unknown environment. This makes these patients realize that they are unacquainted with such an environment and its surroundings, which results in psychological changes in their behaviour, and many times such treatment can have a severely bad effect on the patient's mind, which can further make their problem worse. So, it becomes to keep the patients in touch with their family members and relatives, and should not be kept in remote conditions for a long time [15]

Procedures used in the treatment of Alzheimer's disease

One of the main procedures that are used in the treatment of Alzheimer's disease is the Aducanumab treatment. Aducanumab is a treatment procedure that helps to decrease the number of beta-amyloid plaques, which are highly responsible for causing this disease. Aducanumab treatment is only offered to the patient after his/her proper check-up and evaluation of the effect of the treatment on the patient. This also helps to improve the psychological behaviour of the patient, which is caused due to this brain disorder [16]

Neuroimaging

Neuroimaging is considered one of the most essential processes in the case of Alzheimer's treatment. It is a process of scanning the brain and its internal nerve system with the help of the MRI technique, as it also helps to detect the phase of this brain disorder in the patient, which can further be helpful during the treatment process. It also helps to identify the problems generated in the hippocampus, which is the part of the brain responsible for our thought process and memorizing things. Neuroimaging also helps to detect problems in the neurological functioning of our brain. Neuroimaging is a very beneficial technique, as it helps us to provide a proper scanned image of the brain, which helps to detect the several problems that are caused by the nerves in the brain. Through Neuroimaging the patients suffering from such brain disorders can detect the current state of their mind. Neuroimaging is also helpful in detecting the progress of the treatment among patients suffering from various brain-related problems [17]

Gene Therapy

Gene Therapy is a process of treatment that secures the brain cells from ceasing and further helps to protect our memories and thoughts. In this therapy, a gene is placed inside the patient's brain cell, in which the previous non-functioning cell is

exchanged with the newly modified functioning cell, which further helps the body by developing the molecule necessary for the treatment of the disease. This therapy is considered to be very helpful as it indirectly affects the neurological pathway of the brain because these genes contain codes that help to prevent the brain cells from damaging. This therapy is only processed after properly examining and analysing the compatibility of the patient's body with this treatment. Gene therapy can be considered a turning point in the future toward completely curing various incurable brain diseases. As various brain diseases are hereditary diseases are transferred from the parents to their children by their genes. Gene therapy can help our body, as it helps the genes present in our body to develop functioning that can cure our body and brain cells and can even make our immune system strong and resistant to various diseases. Gene therapy is a modern-era treatment process that has limitless possibilities in the sector of medicine and science [18]

Art therapy

Art Therapy is considered one of the most innovative ways to treat Alzheimer's disease. In this therapy, the patients are given exposure to visualization, by showcasing them artistic things in the form of sketches, paintings, and other forms of art. This helps the patient's brain to increase its thought process and helps communicate with others. This therapy helps to unlock the various opportunities for the treatment of such diseases. It helps the brain increase its thought process and imagination skills, which is very helpful during the treatment of such diseases. Art therapy can be considered a method that helps to teach and nourish the brain of such patients creatively. This therapy also helps the patients to easily communicate their thoughts and ideas with others in more efficient ways; it helps to increase the stability of the brain among such patients [19].

Music therapy

Music Therapy is considered to be one of the most creative and efficient therapy in the treatment process of Alzheimer's disease. This therapy is very helpful in increasing the memorizing power of the patients through various types of tunes and music. This therapy helps to channel the brain's thought process through the rhythmic form of music used during this therapy. It is also helpful in stimulating the old memories in the patients, which can be very helpful during the whole treatment process of such brain disease. This therapy works by providing the patients with different patterns and forms of music, that makes the patients

feel calm and composed, as the music helps to provide a soothing effect to the brain. This therapy is highly beneficial for old age people suffering from such brain disorders, as music helps their minds to feel relaxed and concentrated. This therapy helps to improve and increase the communication skills of the patients, it also helps to improve the psychological behavior of the patients by generating a sense of happiness and positivity in them. It also helps to create a healthy environment among other patients, as during this therapy these patients are allowed to sing a song, which helps them feel connected with the other world and also helps to improve their communication skills by creating a healthy environment [20]

Future Treatment approaches to Alzheimer's disease

- **Anti-Amyloid agents** – The amyloid cascade hypothesis is one of the main suggested pathophysiological processes. Most of the autosomal dominant AD genetic forms lead to the mutation of amyloid metabolism encoding. Amyloid direct therapies are categorized into 3 different levels which are amyloid anti-aggregates, secretase modulators, and immunotherapies [21]
- **Secretase modulators** – It aims to decrease A β production in which the amyloid precursor protein is broken down by the modulate enzyme [21]
- **Amyloid anti-aggregates** – Such a procedure can help avoid the accumulation of Amyloid in non-soluble form. Recent studies talk about the toxic effect of the soluble form of A β [22]
- **Amyloid removal [immunotherapy]**-This therapy aims toward the initiation of humoral immune response to fibrillary-A β 42 or passive administration of anti-A β antibodies [23]
- **Tau-based therapies**- Tau is a microtubule-associated protein that is encoded by the MAPT gene. Tau helps to transport and assemble the microtubules and regulates axonal. The disruption of mitochondrial respiration and axonal transport is caused by hyper-phosphorylated tau [24]
- **Immunotherapy**- It is one of the most recommended therapies that is used for the Treatment of Alzheimer's. In this therapy, the Plaques are directly disassembled by the confrontation of selective antibodies after which microglial cells and phagocytosis of pathological protein deposits are activated by the antibody, after which the microglial cells are activated by non-complement-mediated phagocytosis, then soluble Oligomers are neutralized, toward efflux of

specific proteins from the brain due to equilibrium shift which helps to relieve the immune response towards the disease

- **α -Secretase potentiation Etazolate** - It helps to stimulate the pathway of neurotropic α -secretase that helps in inhibiting the A β -induced neuronal death which helps to provide relief from the disease symptoms and modifies the progression of the disease.

Precaution necessary during Alzheimer's disease treatment

Several precautions can help control or regulate the initial stage of this disease. As precautions are very essential in the treatment of any disease, and when talking about brain diseases things become more critical, because in such cases even a small mistake can result in a big disaster. So, it is very important for a person suffering from such a brain disorder to follow certain norms. These precautions can be anything related to food habits, workout routine, or consumption of the intoxicating drug. The use of intoxicating drugs plays a major role in ruining the condition of patients suffering from such disorders. These precautions are also helpful to patients suffering from the moderate or severe stages of this disease. As most of the people that suffer from the disease are old age people, it becomes very for them to get proper care and treatment, followed by certain norms and precautions. As responsibility increases in case of old age people as they required additional support and care in comparison to adult patients. Proper assistance is much essential in the case of such old age patients suffering from any brain disorder, as due to such problems these patients sometimes forget things and go through problems like hallucination and delusion, which can be harmful to these patients if they are not assisted properly. One of the major problems of old age people suffering from such disease is that they are unable to communicate properly with the outer world, in such cases only doctors and nurses can be helpful to communicate with such patients, which can be helpful to understand the problem of such patients [25]

The several precautions that can help during the treatment of this disease are as follows:

- Minimum usage of liquor
- Consumption of a healthy diet on regular bases
- Proper workout routine
- Meditation on regular bases
- Visiting peaceful places

It is very essential for the patients to follow such norms and precautions, as the regulation of these things is very helpful during the treatment process. As mentioned above the use of alcohol or any intoxicating drug have a direct effect on us, and if the patients suffering from certain brain disorder consume such drugs, their brain becomes more prone to damage than cure, so it becomes highly necessary for the patients to avoid the use of such things, as they ruin the effects of treatment. A healthy diet also plays a major role in our fitness and our day-to-day life as proper health will keep our body sound and tuned, whereas an improper may arise several problems and diseases to the body, and for the patients suffering from any brain disorder a proper diet plays a crucial role as the proper diet will help such patients to attain essential nutrients that are essential for our body and our brain altogether, as this help to vitalize our brain activities properly [26]. Another factor that plays a critical in the treatment of such disorder is a proper workout routine, as proper help to channelize our by stimulating our metabolism, it also helps to activate our brain's neurological pathway by reducing the unnecessary fatigue, so it becomes very beneficial and important for the patients suffering from brain disorder to have a proper and regular workout as it helps their body and their brain to stay fit and healthy and helps them to cope up with the day-to-day stress, workout also helps to improve the mood of such patient and also helps to release dopamine hormone, that is present in our brain, which helps to generate a feeling of happiness in human. Meditation plays a very crucial role in any brain-related problem as it helps the person to calm and relax and also helps in increasing the power of focus and concentration by relaxing our mind, mediation is considered one of the best healing processes for the brain, as it also helps our brain to stabilize and improve our memory and thought process, mediation also helps the person to connect with nature by improving the psychological pathway of our body and brain. So, meditation can be considered a boon to patients suffering from any brain disorder as it helps their brain to stabilize and work properly and efficiently and helps to reduce the effects or problems caused by such brain disorders [26]. The surrounding environment also holds the main criteria for the proper health and fitness of a person, as a peaceful and naturally fresh environment would be much more good for the person in comparison to a polluted and noisy, as the environment somehow has a direct effect on the body and its healthy, as a person residing in a clean and green fresh environment would much healthy internally in comparison to the person living in an environment full of pollution and

lacking natural habitat in their surroundings. As the person living in nature surrounded environment would be able to breathe fresh and clean air, as air pollution these days is a major concern for different types of breathing problems and many other diseases. And when talking about the patients mostly the old age people suffering from any such brain order, who need to be kept in an eco-friendly environment where they can relax and stay in a peaceful environment surrounded by nature's greenery and would be able to breathe clean air free of pollution. The nature-friendly surrounding also helps old age patients to connect with nature, which further helps them to boost their brain health and to reduce the problems generated by their disease. Similarly, hygiene is also very important for these as the improper management of hygiene leads to the development of different diseases and problems altogether.

The precautions are very beneficial to the patients during the treatment, as they help them in controlling and minimizing the effect of such disorder. These precautions further help the patient to get motivated, improve their skills, and follow a healthy lifestyle on a regular base. These precautions are helpful for the long-term condition; the precautions followed properly by the patients regularly may result in lowering the effect of this brain disorder up to a large extent, as these precautions help to build the internal strength among the patients and also help to increase their will power. Properly followed precautions also help to increase the proper effect of medicine and therapy on the patients.

CONCLUSION

As mentioned above various methods and therapies have been developed and are still developing for the treatment of Alzheimer's disease and other brain disorders diseases. It is very essential for us to properly deal with problems arising in the path of medication and treatment of this disease, which can only be achieved through knowledge, timely treatment, early diagnosis, proper infrastructure, etc. The several drugs used for the treatment of this disease need to be used under proper guidance and concern, as improper use of these drugs can lead to drastic side effects that can have a bad effect on our brain. Alzheimer's is an incurable disease, so it can only be regulated through medicines and natural activities. Scientists and doctors are researching on to find new techniques that can help cure this disease in the future. Awareness of the cause and symptoms of the disease is also a very important basic factor toward the

advancement in the sector of brain-related problems, as proper information and knowledge about such disease can help avoid or reduce the effect of such diseases, as it is basic criteria for any disease to know the root cause of that disease before its treatment. The New treatment approaches that are being used are being for the treatment of Alzheimer's disease are very crucial and beneficial for the proper treatment of the disease the new methods and techniques such as immunotherapy help the patient to provide relief against the adverse effect of the disease and is considered to be helpful in controlled and lower the ill effects of the disease. The New treatment approaches can be helpful in finding the root cause of this disease in the future and providing a proper cure for it.

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CONFLICT OF INTEREST

The authors declare no conflict of interest

AUTHOR CONTRIBUTION

Abhishek designed the work and revisions in the manuscript. Sourav provided maximum effort in the correction, collect documents, makes proper format. Both did a proper literature survey and designed the manuscript. The manuscript was finalized by Abhishek.

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