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NOVEL DRUG DELIVERY SYSTEM: A PROMISING APPROACH IN MANAGEMENT OF SCHIZOPHRENIA – A REVIEW

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ABSTRACT
Schizophrenia is a syndromic condition which is characterized by a set of signs and symptoms like delusions. It is severe non-curable illness of the brain. If not controlled and treated properly, it can lead to severe consequences. One can control these delusions by means of treatment, by using Conventional therapy or Novel therapy. There are various advantages of Novel system over Conventional system. This review focuses on understanding Novel system and its advantages over Conventional system.

INTRODUCTION

Schizophrenia is a disease characterized by various signs and symptoms. It is psychotic illness that is characterized by delusions, hallucinations, thought disorders and speech impairment. Symptoms include

Positive Symptoms: It includes

- Delusions: It is an unshakable belief in something untrue. They are false beliefs.
- Hallucination: It refers to sensations which refers to be real but in reality they are created my mind

- Garbled sentences: It refers to a condition where a person is unable to say a complete sentence.
- Irrational conclusions: It refers to a condition where a person makes conclusions based on what they perceive.
- Aggressive behavior: It is due hallucinations. Due to irrational conclusions, patients become aggressive in nature [1-3]

Negative Symptoms: It includes

- Withdrawal from society: Due to delusions and aggressive behavior, patients are unable to concentrate and this causes neglection from the society and they tends to remain alone.

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- Lack of response: Because of irrational conclusions and inability to respond to the situation, patients suffer from lack of response.

Schizophrenic patients suffer from cognitive functioning. Because of this, such patients have a high chance of attempting suicide. From the literature, it is clear that 10% of schizophrenic patients attempt suicide [1-3].

ETIOLOGY OF SCIZOPHRENIA

- Environmental and Genetic factors: According to research, schizophrenia has some co-relation with environmental and genetic factor.
- High Level of Dopamine: Dopamine is considered to be the important neurotransmitter for leading to development of Schizophrenia. In schizophrenic patient, there is elevation in dopamine level in dopaminergic pathway and leading to positive symptoms. Because of this, it is considered an important culprit in Schizophrenic patient.
- High Level of Serotonin: High level of serotonin in serotonergic pathway causes Schizophrenia and leading to negative symptoms.
- Low Level of Glutamate: Low level of glutamate in glutamatergic pathway causing Schizophrenia and its decrease level causes confusion [2][4].

TREATMENT OF SCHIZOPHRENIA

For treatment of Schizophrenia, there are two types of drug classes available

1) **Typical antipshycotic drug class:** This is the class which is also known as FIRST GENERATION DRUG CLASS. It includes drug which were developed in late 1950s. It includes drug like Haloperidol, Chlorpromazine[4]

2) **Atypical antipshycotic drug class:** This is the class which is also known as SECOND GENERATION DRUG CLASS. It includes drug which were developed in 1990s. It includes drug like Clozapine, Risperidone [4][5].

CONVENTIONAL DRUG DELIVERY SYSTEM

It involves formulation aspects of drugs, where it uses conventional knowledge of formulation to formulate a dosage form. It is a classical method.

Advantages of conventional delivery system:

Following are advantages of Conventional delivery system

- patient appliance
- cost effective
- chemically stable
- no specific packaging required
- suitable for all types of patients

Disadvantages of conventional delivery system:

Following are disadvantages of Conventional delivery system

- no target specific
- less bioavailability
- delayed action
- not suitable in case of emergency
- frequency of dosing is more
- prone to high chance of side effects[6][7][8].

NOVEL DRUG DELIVERY SYSTEM (NDDS)

It involves approaches, formulation aspects, use of techniques and system for movement of pharmaceutical product in body. It is advanced method.

Advantages of novel delivery system:

Following are advantages of Novel delivery system

- quick action
- enhanced bioavailability
- can be used in emergency conditions
- has less side effects
- frequency of dosing can be reduced
- more patient compliance than Conventional system
- they are target specific

Disadvantages of novel delivery system:

There are few disadvantages which are listed below

- costly
- specialized packing is needed [1][6][7][8][9].

TYPES OF NOVEL DELIVERY SYSTEM

Classification of novel drug delivery system with reference to release control is:

1. Matrix Diffusion Types: In which rate of release is controlled by diffusion of dissolved drug in the matrix [10].
a) Rigid Matrix Diffusion: Here, diffusion occurs through rigid material like PVP & fatty acids [10][11].

b) Swell-able Matrix Diffusion: Here, diffusion occurs through Hydrophilic gums like guar gum, tragacanth, HPMC, CMC, Xanthan Gum & Polyacrylamides. These are also called as Glassy Hydrogels and popular for sustaining or controlling the release of highly water soluble drugs [10][12].

c) Reservoir System: Here, polymer contents a coating. Thickness of this coating & hardness of micro-capsules control the release of the drug [10][13].

2. Dissolution Matrix Type: Here, the drug is uniformly dispersed throughout in a rate controlling medium waxes like bees wax, carnauba wax, hydrogenated castor oil, which control the drug dissolution by controlling the rate of dissolution. Example of dissolution matrix type is encapsulation. In encapsulation, dissolution of drug is controlled by dissolution controlling coating system like use of cellulose, Polyethylene. Glycols, polymethylacrylates, and waxes. Dissolution rate also depend upon coating material stability and thickness of coating film [14].

3. Dissolution & Diffusion Controlled Release System: Here, the drug is encapsulated in partially soluble membrane, pores are created due to soluble parts of coating film which permits entry of aqueous medium into core and drug dissolution starts by diffusion of dissolved drug out of system. Mixture of water soluble PVP and water insoluble ethyl cellulose is used for this purpose [15][16]s.

4. Water penetration/Osmotic Pressure Controlled NDDS: Due to difference in osmotic pressure, sustained release of drug occurs [17].

5. Hydrogels: It consists of three dimensional structures of hydrophilic polymers having chemical and physical cross links provide a network structure to hydrogels. These are insoluble due to network structure and provide desirable protection of liable drugs, proteins and peptides [17].

WHY NOVEL DRUG DELIVERY SYSTEM SHOULD BE FAVOURED?

There are various advantages of Novel delivery system over Conventional delivery system, which can be used in treatment of Schizophrenia. Following are the advantages

1) NDDS like sustained released and target oriented, which can be more useful in Schizophrenic patients. Schizophrenic patients suffer from delusions. These delusions can occur at any time of the day. When such patient is administered with sustained release dosage form, it can be helpful in controlling delusions [18]

2) With help of NDDS like polymer coating, frequency of dosing can be reduced to once a day, where as in case of Conventional drug delivery system dosing frequency is 3-4 times a day [19][20].

3) With help of NDDS like Osmotic Pressure Controlled, the formulation aspects of drugs are improved and because of which compatibility of drug in the body increases [21].

4) By means of NDDS, target oriented pharmacological effects are achieved. This had led to decrease in toxicity profile of drugs [22].

5) By Dissolution Controlled System, bioavailability of drug is enhanced [23].

6) Novel drug delivery system are more patient compliance than Convenient drug delivery system [24].

7) Novel drug delivery system like LIPOSOME have high level of Lipophilicity. This can be used in crossing blood brain barrier and this can be very useful in treating Schizophrenic patients [25][25].

CONCLUSION

In order to treat Schizophrenic patients, Novel drug delivery system have many advantages over Conventional drug delivery system. From the review it is clear that for the treatment of Schizophrenic patient, Novel drug delivery system would be the most promising approach than Conventional drug delivery system.

FINANCIAL ASSISTANCE

CONFLICT OF INTEREST
The authors declare no conflict of interest

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