Original Research

MANUFACTURING OF NEW FORMULATION OF GENTAMICIN CAPSULE

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ABSTRACT

Gentamicin is a broad spectrum aminoglycoside which is semi synthetic or natural bacteriocidal antibiotic**.** In the present study new formulations of Gentamicin[2] was manufactured by manual capsule filling machine using talc, starch and magnesium stearate. The present study is divided into two stages. In the first stage new formulation of Gentamicin[2] capsules were prepared and in the second stage evaluation of the physicochemical parameters were carried out i.e. weight variation, disintegration and dissolution. The results showed that all parameters of new formulations of Gentamicin[2] capsules are in accordance with the BP/USP limits. The advantage of this method is that it is quite simple and economical therefore this method can be easily used for manufacturing of capsules.

KEYWORDS: Gentimicin, Dissolution, Disintegration, new formulation

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INTRODUCTION

A broad spectrum aminoglycoside Gentamicin is a semi synthetic or natural bacteriocidal antibiotic. It is used clinically to treat and prevent infections caused by gram negative, mycobacterial, enterococcal bacterial infections. It is a hydrophilic agent distributed to body fluid and excreted without metabolic or degradation changes principally by glomerular filtration through the kidneys, with 5-10% dose is concentrated in proximal tubules hugely exceeding the concurrent serum concentration.[1,2,3] It acts on the bacterial ribosome that binds to the 30S ribosomal subunit of bacterial cells, interrupting bacterial protein synthesis. It has a relatively low bioavailability, short half-life and may cause side effects such as nephrotoxicity and ototoxicity because application of Gentamicin[2] in high doses resulted in accumulation in the renal proximal tubular cells and cochlea of the inner ear and.[3,4] Although treatment with one-daily dose of aminoglycoside derivatives have restricted this side effect.[5,6] For the empiric treatment of presumed infection gentamicin is commonly used in neonates with hypoxic ischemic enchepalopathy[2] (HIE).[7] in fact it is a mixture of a number of minor components and the three major components i.e. gentamicin C_1, C_{1a}, and C_2.[8]

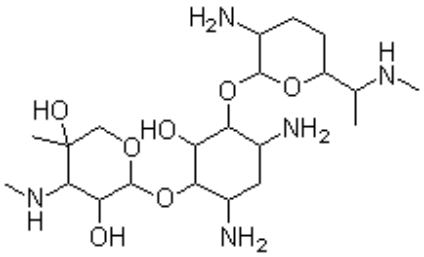

Fig-1 Structure of Gentamicin

METHODOLOGY

MATERIALS

The ingredients used in this formulation were Gentamicin, talc, starch and magnesium stearate. All of them were of analytical grade. For quantitative analysis, the standard used was Gentamicin.

MANUFACTURING OF NEW FORMULATIONS:

Accurately weigh all the ingredients of capsules than transferred them into suitable polyethylene bag. Ingredients were mixed by tumbling action in a large size poly bag for 5 minutes. Finally adjust the capsules shell into the capsules filling machine carefully so the body adjust in the lower hole. The head of capsules were unlocked by adjusting the lever. Fill the powder blend in the body of capsule. Place the upper plate carrying head of the capsules and locked them on the body with the help of the lever.

CAPSULES SPECIFICATIONS

After manufacturing of a new formulation of capsules all of the following parameters were analyzed i.e. weight variation, disintegration and dissolution.

- **Weight Variation test**

  Weight Variation (in process test) ensures that content of each dosage units is uniform during compression. Accurately weigh 20 capsules of each brand on Electronic Balance FX-400. Calculate the weight of each capsule that must be within official limits.[3]USP/ BP states that the capsules containing less than 300 mg of the total weight may be outside ±10% of the average (NMT two capsules out of the sample) and all must be within 20%.

- **Disintegration Test**

  Disintegration apparatus Curro model no DS-0702 was used for this test. Place one capsule in each of the six tubes of the basket and add a disc (if specified). Using water or another liquid (unless specified) as the immersion fluid, operate the apparatus by maintaining its temperature at 35-39 °C. Finally at the specified time, pick up the basket from the fluid and check whether all of the capsules have disintegrated completely. The test is repeated on 12 extra capsules if one or two capsules fail to disintegrate. The requirements are met when out of 18 capsules 16 are disintegrated. According to USP, capsule should disintegrate in not more than thirty minutes.

- **Dissolution test**

  Dissolution test was carried out on GDT-7L of Galvano Scientific dissolution apparatus. Assemble the equipment, pour 900ml of water in the vessel and place it in the water-bath. Maintain the temperature of water bath at 37±0.5°C. Place one capsule of new formulation in a dry basket and lower the basket into position before rotation. The rotation of the basket was set at 50RPM. A sample of 10 ml is withdrawn each time from the vessel at 15, 30, 45 and 60 min respectively. The sample must be taken from a zone midway between the surface of the dissolution medium and the top of the rotating basket, at least 10 mm from the vessel wall and not less than 10 mm below the surface. The quantity of Gentamicin[2] dissolved was determined as specified in official books. The *in vivo* bioavailability of drug can be best evaluated by this test. [9]

RESULTS

The physicochemical parameters of new formulation of Gentamicin capsules were analyzed. The results of average weight of 20

capsules are shown in table 1. Disintegration Test results is shown in Table 2. Dissolution test results are shown in Table 3and 4.

DISCUSSION

In the present study new formulation of Gentamicin was manufactured. For manufacturing of new formulations manual capsule filling machine was used. Manual capsule filling has the advantage over other methods in that it is a simple and economical process. All parameters of wt. variation, disintegration and dissolution.

No of capsules	Average (mg)	Standard deviation %	Upper Limit (X+3S)	Lower Limit (X-3S)
20	269.05	6.048	287.19	250.91

Table 1: Statistical weight variation

No of capsules	Disintegration time (min)	Limits	Deviation from USP
6	1.27	NMT 15 Min	PASS

Table 2: Disintegration test

No of capsules	Absorbance of drug			
	15min	30min	45min	60min
6	2.143	2.152	2.177	2.186

Table 3: Absorbance at different time interval

No. of capsules	Dissolution at 30 min	Official Specification	Deviation from USP
6	99.58%	Not less than 80%(Q) of the labeled amount dissolved in 30 min	Pass

Table 4: Dissolution test

of new formulation were carried out. In our trials, the result of average weight of 20 capsules was 206.05mg and their upper & lower limits are 287.19 and 250.91 respectively. According to official requirements : weight variation are met when out of 20 capsules of each brand the weight of not more than 2 capsules differs from the average weight by more than 10%. Disintegration Test is carried out on 6 capsules and they disintegrate in 1.27 min. According to official specification: capsules should disintegrate in NMT 30 minutes. Dissolution test demonstrate the result as 99.58%. As per official limits for capsules, dissolved amount of capsules should NLT 80% (Q) of the labeled amount. All the results showed that they are in accordance with the BP/USP limits.

CONCLUSION:

All parameters wt. variation, disintegration and dissolution of new formulations were carried out and results showed that they are in accordance with BP/USP limits. The advantage of this method is that this method is quite simple and economical therefore we use this method.

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