Improvement in yield in the production of slow release oral dosage forms

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INTRODUCTION

The coating of solid oral dosage forms is a commonly utilised process in the pharmaceutical industry and has been carried out for many centuries with the first records dating to the ninth and eleventh century. [1-4]

Yield is a measure of the efficiency of a process. One means to achieve a high yield, during a coating process is by limiting the waste generated.

AIMS

To improve the yield of slow release production process undertaken in a pharmaceutical company by determining which parameters are affecting the yield.

METHOD

Thirty batches were statistically analysed to identify the effect of parameters on the yield of the active pharmaceutical ingredient (API). The production method for the slow release pellets adopted a coating pan and process parameters were occasionally varied during the production process.

Another eight batches were produced adopting a different approach, which was developed following the information obtained during the production of the previous set of batches. During the production of these batches, parameters were varied according to the need of the product, while being kept within the stipulated limits, according to the requirements of the coating process and the product's marketing authorisation.

Process parameters such as temperature and pistols' distance, were changed during production, taking into consideration characteristics including wetting and surface roughness.

The Independent Sample t-test was used to establish any difference in the yield of API and surface roughness rating of pellets produced. One-Way Anova was used to evaluate differences between the eight batches produced using the new method.

RESULTS

When using the new method there was a statistically significant improvement in the pellets' surface roughness when compared to that of the first set of batches (p-value 0.004).

A statistically significant improvement (*p-value* 0.030) was observed in the percentage yield of API for batches produced with the new approach (94.09%) when compared to batches analysed initially (92.43%).

Batches produced with the new approach achieved the required dissolution rate after the application of the second slow release coating, eliminating the need for a third slow release coating which was normally required.

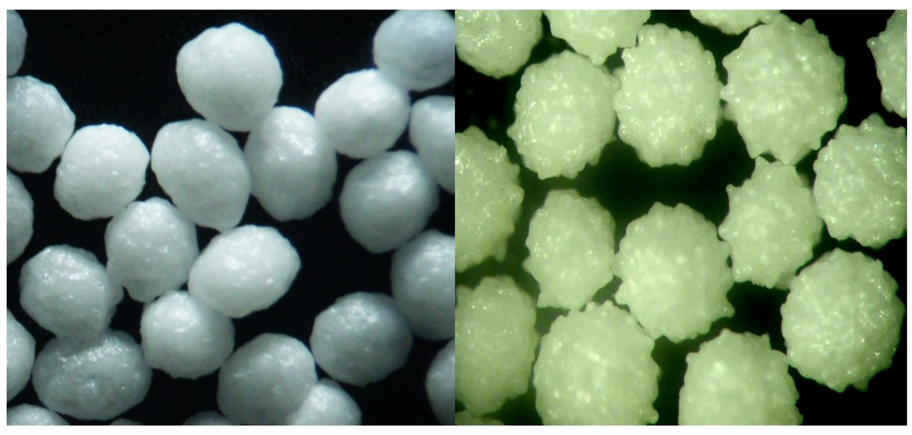

Figure 1. Pellets as seen under a microscope (*Left — pellets with a very smooth surface, rated 5; Right — pellets with a rough surface, packed with large spikes, rated 1*).

Rating	Description of pellet surface
1	Surface is densely packed with large spikes
2	Surface is densely packed with small spikes
3	Surface has some spikes
4	Surface is irregular but no spikes
5	Surface is very smooth

Table 1. The pellets' surface roughness rating and corresponding description.

CONCLUSION

The developed approach led to a more efficient production method with a higher percentage yield of API. This shows that batches vary from one to another due to varying conditions such as humidity, and therefore each batch must be treated individually and different conditions should be applied for the production of each batch.

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