

Emerging trend of using ecofriendly packaging in pharmaceutical industry



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1. Introduction

Packaging is the final step towards delivery of safe products in the hands of consumers. The major packaging material used today in pharma industry is plastic which has a huge impact on increasing the global carbon emissions. Global sales of the pharmaceutical sector has reached \$1.3 trillion, and thus there is a need to look into the packaging material (1). This sector is producing approximately 55% more carbon emissions and plastic pollution than the automobile industries (2). Thus, switching to eco-friendly, reusable and recyclable products for packaging can help us in not only improving the health of environment but also indirectly improving the health of humans by decreasing the green-house effect (3). It is estimated that there is a need to decrease the global pharma carbon emissions by 59% till 2025 to meet the target set by Paris agreement (2).

During the last few years, many researches have been ongoing for the development of biodegradable and reusable packaging materials in pharma industry. Common eco-friendly materials like cardboard, recycled paper have found wide applications in this industry. Additionally, scientists are also exploring the use of materials like sugar cane, corn starch, pectin, gelatin and wheat bran for packaging of pharmaceutical products. The recent developments in this field are discussed in the following section (1,4).

2. Various eco-friendly plastics

Plastics have the maximum carbon footprint which eventually leads to increase in CO₂ levels in the environment. The CO₂ being a greenhouse gas causes an increase in the temperature of the environment which finally leads to global warming. Thus, there is a drastic need to switch to the eco-friendly packaging alternatives (5). The biodegradable plastic can degrade within a decade whereas, conventional plastic takes hundreds of years to degrade. This advantage offers the need to develop biodegradable plastics which also have the tendency to emit much lesser amount of carbon, thereby, making them eco-friendly too (1).

2.1 Polylactic acid (PLA)

PLA is being prepared from natural materials like sugarcane, corn starch and cassava (1). This PLA have shown to reduce carbon emissions, lessen production of energy and also possess the ability of controlling the temperature of the products. Besides these advantages offered by PLA, there are some challenges associated with it and researchers are working on it to overcome those shortcomings (1,6)

2.2 Plastic made from sugar cane

Natupharma have developed a biodegradable plastic by incorporating biodegradable plastic additive into sugar cane. This plastic is both recyclable and CO₂ neutral. Moreover, the strength of this plastic is equivalent to that of the conventional plastic (5).

2.3 Post-consumer grind

Post-consumer regrind plastic offers various advantages over normally used plastic material i.e., polyethylene. They require less energy for their production and they also produce lesser waste (1,7).

2.4 Polyolefin laminates

Romaco Siebler and Huhtamaki are launching a blister package made from polyolefin laminate which is recyclable in nature. As this product requires 60% lesser raw materials then a normal blister packaging thus, its price would also be significantly lower. This packaging would also enhance the shelf-life of the product (2).

3 .Mechanism of action of eco-friendly packaging

The most commonly proposed mechanisms of degradation of biodegradable plastics are a) photodegradation of the material which produces smaller molecules which does not harm the environment, b) some materials degrade easily when they come in contact with some chemicals in the presence of aqueous medium, and c) degradation by microbial action (4). The mechanism of degradation has been shown in figure 1.

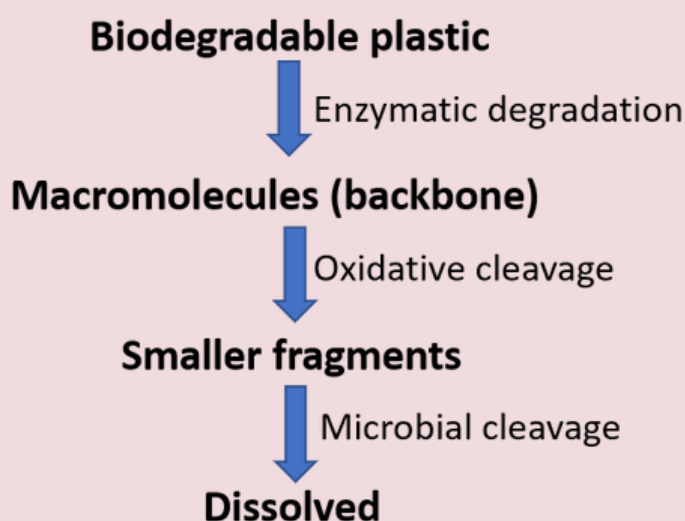


Figure 1. Mechanism of degradation of biodegradable plastic

4 .Growth potential of eco-friendly packaging

Talking about the current scenario, Europe is the largest producer of eco-friendly packaging in pharma industry (8). The pie chart representing the major producers have been depicted in figure 2.

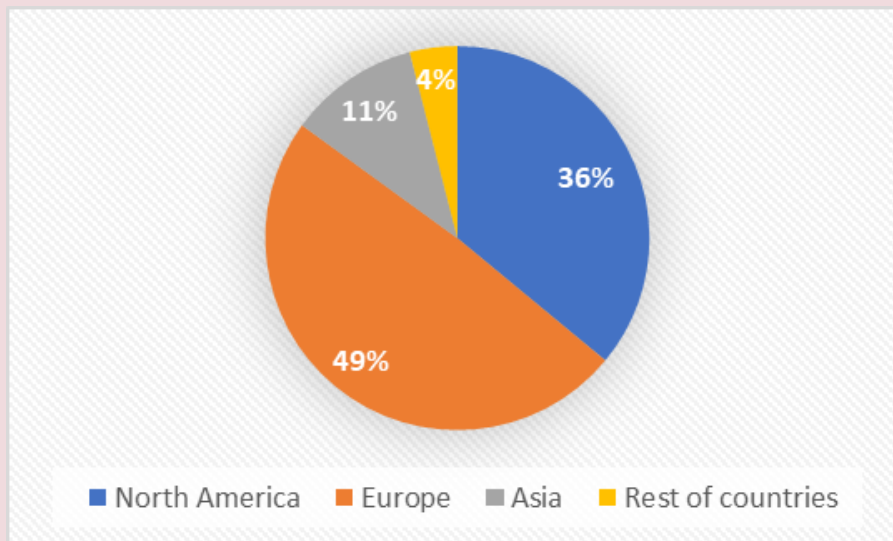


Figure 2. Percentage of countries using eco-friendly packaging in pharma industry (9).

With the increasing demand of healthcare products and medicines as seen in the current pandemic situation, the pharmaceutical packaging industry have been also proposed to reach £84 billion by 2024 (9). According to World Health Organization statistics, more than 300 M tons of waste from plastic have been produced from pharma sector. Out of that, almost 50% waste was generated from the products which were used one time. Despite of such a large waste production, only 10-25% of companies are producing eco-friendly packaging materials. Thus, there is an essential need to produce more and more biodegradable alternatives (10).

Additionally, as per Trivium Packaging's 2021 Global Buying Green Report, more than 80% young consumers are agreeing to pay extra money for eco-friendly packaging. Therefore, seeing all these scenarios, more and more companies are now indulging into eco-friendly packaging. Currently, it has been noted that more than 50 companies are involved in producing eco-friendly and sustainable packaging options (11).

5. Conclusions

More and more pharmaceutical companies are now diverting from non-biodegradable packaging material to the plastic derived from biodegradable materials like sugar cane, corn starch, paper, cardboard, etc. This will eventually help in reducing the carbon emissions, protect the environment from global warming and help in protecting the environment and human health.

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