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Current Response to the Problem of Ocean Plastic Dumping in Japan

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Jun Kobayashi*[1], Keiichi Ikeda[2]

[1]Faculty of Nutrition, University of Kochi, 2751-1 Ike, Kochi, Kochi 781-8515, Japan; [2]Faculty of Pharmaceutical Sciences, Hokuriku University, 3 Ho, Kanagawa-machi, Kanazawa, Ishikawa 920-1181, Japan

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ABSTRACT

A global movement to prevent the disposal of plastic in the ocean and reduce the production of plastic products gained urgency after a video of a sea turtle affected by plastic waste received widespread attention. However, there are still significant obstacles to completely solving the problem of plastic disposal. For example, although a large number of plastic products are used, currently, their recovery, disposal, and reuse are not conducted appropriately. In this paper, we report the situation in Japan and its relationship with the manufacture of plastic products, and their treatment (reuse, disposal), etc. This is a global problem that was raised at the recent G20 Summit; however, effective countermeasures can help solve this problem shortly.

INTRODUCTION

The problem of plastic disposal into the ocean has been highlighted recently, and rapid measures are being taken to prevent this. The global attention received by the video of a sea turtle with a plastic straw stuck in its nose was one of the reasons for increased attention to the problem of plastic waste in oceans. It is not bad to seriously discuss the problem of plastic disposal in this way. However, there is also the point that we wonder if the measures that have not been implemented so far are such that they become the triggering agent and the measures will be taken immediately. Also, it seems that some measures adopted are not adequate, and more effective measures can be initiated by learning from other countries. In this paper, we describe the history of problems related to plastics in the past, and present countermeasures for the future, including the author's thoughts.

Process up to the current situation

In August 2015, a team at the Texas A & M University rescued and treated a sea turtle with a plastic straw in its nose off the coast of Costa Rica. The video of this sea turtle, first reported by The National Geographic channel[1)], received widespread global attention. The story was widely reported across media in Japan in July 2018. Though the turtle took the straw by accident, the background of this accident presents a serious issue of plastic waste in oceans.

Plastics are chemically synthesized from oil and coal and can be easily molded. Because they are also lightweight and durable, they are used for various daily necessities and have become an essential commodity in modern life (as of 2017, production volume in Japan is 5,830,000 tons, Fig. 1). The problem of plastic disposal in oceans is caused by the improper reuse of plastic; to save time and effort involved in waste disposal methods such as incineration, plastic is drained into the ocean as waste. The fact that sea turtles were reported in Japan was also introduced as one of the reasons in parallel to the information that the regulation of the use of some plastic products began.

Even more fundamentally, it is the person who made the plastic, and we must strongly recognize the fact that much of what is used on land is converted into marine debris (in addition to land areas, there are garbage such as fishing lines and nets, but in any case they are manufactured by people, and accidentally or deliberately discarded). This also relates to waste disposal problems.

Harmful impacts of plastic

Because plastic is barely decomposable, those that are disposed into the ocean will exist in the ocean for a long period, and will be consumed by various organisms such as whales and sea turtles[2)]. High-frequency plastic feeding has also been confirmed in seabirds[2, 3)]. The effects of plastic feeding on animals include physical eating disorders, such as clogged digestive tract and toxicity caused by the transfer of chemical substances derived from plastic into the body. In particular, the latter is known worldwide as an “environmental hormone problem". In this case, not only bisphenol A, which is the raw material of plastics, but also substances that have an endocrine disruptive action such as polychlorinated biphenyls and polybrominated diphenyl ethers, which are easily adsorbed to plastics, are transferred to the body.

Furthermore, plastic is altered to finer microplastics (strips of 5 mm or less in diameter) by the action of ultraviolet light and the like[4)]. Microplastics include not only substances which are fragmented in the environment but also microbeads (1 mm or less) which are found in cosmetics and detergents.

Because microbeads are particularly small, they are also difficult to recover as dust. This micronized material cannot be removed by sewage treatment, and enters small organisms such as plankton and small fish and exhibits toxicity[3)]. It is believed that it will change to another organism by being preyed on a larger fish.

Past measures in Japan

As the harmfulness mentioned above was recognized from old times, it does not mean that measures have not been taken so far. However, until recently, the idea of reducing the use of plastic products was not considered because of the great convenience provided by such products. Thus, new plastic products continue to appear in the market.One measure is to separate and reuse waste finely for each type. In countries where recycling is carried out thoroughly, as in Germany, one product is likely separated by material, by type and then disposed of as waste. However, in Japan, bags that collect combustible waste such as paper are made of plastic and may not be finally incinerated. Also, there may be different standards for wastes than can be incinerated in different municipalities. Also, it has not been classified as finely as in Germany.

Currently, many plastic bottles of different sizes are used in Japan. When the use of large (1 L or more) plastic bottles was originally introduced in 1982, it was discussed whether smaller ones should be introduced as well. Those opposed to the introduction believed that the move would increase plastic waste, while those in favor that such bottles would be lighter and more convenient to carry than glass. Since 1996, plastic bottles of 500 mL or less can be used, and almost all plastic bottles now have a brand of the raw material to promote recycling and they go it a lot. However, few people follow the process of cleaning the inside of the container, removing the label, separating the cap and the main body, and then appropriately disposing of each material as waste. Recycling in Japan is often called "thermal recycling", in the sense that it recovers thermal energy when it is burned as waste and is different from the method that is generally used (Fig. 2). The recycling rate of plastic material is only 9% in the world and naturally low in Japan[2].Manufacture of new plastic products consumes more petroleum resources, which in turn results in carbon dioxide emissions that lead to global warming which is a serious global environmental problem. Therefore, if possible, the first plastic material itself should be recycled. Thermal recycling should be an unavoidable method when a product cannot be recycled as a plastic substance, and it is not preferable to rely on this.

Also, there is a problem that China is not responsible for the disposal of plastic waste from Japan, and there is no place for waste disposal in Japan[2]. This indicates that even if thermal recycling is included, due to the low recycling rate in Japan, plastic waste is being exported to be treated by other countries. The fact that recycling and disposal do not proceed according to all the use of plastic (not all can be covered at least in their own country) also becomes a very serious problem.

The introduction of biodegradable plastics was previously considered[6]. This is that when plastic is buried in soil, it gradually degrades by environmental microbes (so-called return to soil). At present, this development is not considered feasible because most biodegradable plastics developed to date are degraded only to microplastics, and some that can be degraded are expensive and not very durable.

Future measures in Japan and their negative effects

Some of the initiatives highlighted in Japan as of July 2019 include: 1) a chain of fast food stores that is expanding worldwide is taking the initiative to change plastic straws to paper. 2)

Studies are underway to reduce disposable bags (so-called plastic bags) that were distributed free in supermarkets and convenience stores. 3) Prohibit plastic toys distributed at famous fast food stores as it is tending to do in the United States, and there is a movement in the branch of Japan to collect toys that were distributed in the past, to recycle them.

As for 1), the use of paper straws may be possible for some beverages; however, their application for all beverages may be difficult. Depending on the type of beverage, it may be possible to use paper and plastic straws separately, but this can be difficult as it takes a lot of time to serve customers. As for 2), the authors have already pointed out[7]. In a convenience store, people may purchase products such as lunch boxes and carry them in their hand. A customer may feel that the store's service has deteriorated if a carry bag comes at a charge or is not provided, and the reduction may be difficult for the store in the sense of preventing the customer from leaving. Briefly, the store may ask the customers to confirm if they do not need a bag. This problem may be solved if the use of ecological non-disposable bags is extended or if, like earlier, paper bags are used before instead of plastic bags. Although paper bags suffer from limitations such as being difficult to transport, and low resistance to load and moisture, their use may be necessary to support the environment. As for 3), we do not know if it makes sense. Cancellation plastic toys are preferable if it is perceived as something free and unnecessary.However, if it is not for sale useful for children, there is no need to abolish it. We think that it does not matter to collect what became unnecessary, like correspondence from Japan. There are many other plastic products in use, but it is difficult to replace them, for example in medical devices, at present.

As mentioned earlier, one of the fundamental measures is to limit the use of plastic materials through recycling and proper disposal in Japan. Replacements of other than those, that must be plastic, may also be necessary. For example, in the case of Germany, the collection of waste with an exhaustive classification and the improvement of the recycling rate may result in a reduction in the amount of waste, which may alleviate the restriction of its use.

About microplastics, the incorporation of microbeads into cosmetics in the United States has been banned since 2015, and the Japan Cosmetic Industry Association has called for self-regulation in Japan since 2016. However, it has been reported that high quantities of microplastics are present in much commercially available mineral water and salt[8].

At the G20 Summit, held in Japan in June 2019, an action to eliminate marine plastic pollution by 2050[9] was adopted. It has been argued that this timeline is too late; however, to put this into practice, the elimination of the plastic disposal in oceans and the recovery of existing plastics from the sea become major problems. Additionally, it is also necessary to consider the reduction in the use of plastic products, which is a fundamental factor. It will be an issue in the future to obtain the consent of many countries (people who use it) and ensure that there are inconveniences caused if such a reduction is implemented.

SUMMARY

The damage to sea turtles by plastic disposed of in oceans has resulted in global efforts to reduce plastic disposed of in the ocean and the use of the plastic product. The measures adopted so far, however, are considered inadequate given that the scientific impact of plastics has been known for a long time. At the same time, it is extremely questionable whether the interest of citizens in reducing plastic disposal and consumption will continue to remain high. We hope that the movement in this world will not be transitory and will continue even if there are restrictions in daily life.

For this purpose, it is important to implement immediate measures nationally and internationally, including legal introduction, shortly. Further delay may lead to a reduction in the public interest and the public opinion may be opposed to the loss of convenience caused by the reduced use of plastic products. It is difficult for us to predict how to proceed in the future; thus, observing trends reported on this issue in the news will be a good way to follow further developments.

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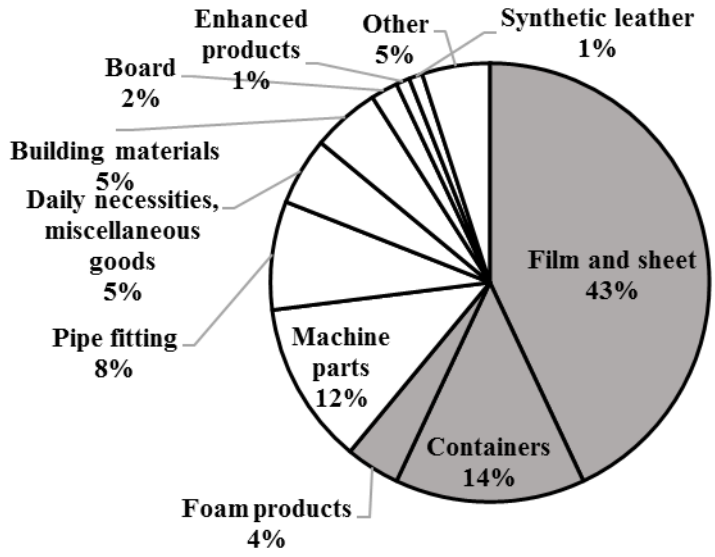

Figure no.1 Production of plastic products in Japan

Based on the data in reference 2).

Total production in Japan is 5,830,000 tons as of 2017.

Film and sheet, containers, and foam products are mainly disposable plastic.

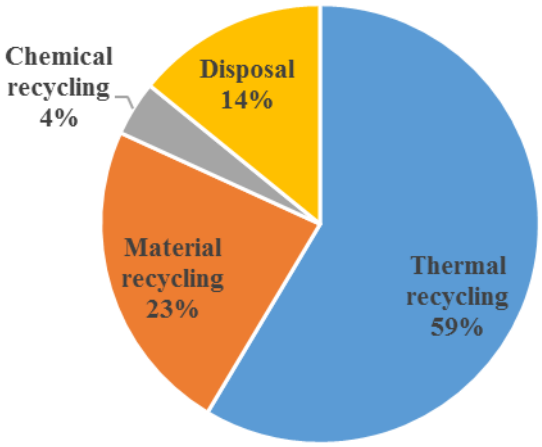

Figure no. 2 Plastic recycling method in Japan

Based on 2017 data in Reference 5).

Thermal recycling: Convert waste plastic into solid fuel or incinerate to recover thermal energy.

Material recycling: Recycling plastic products from waste plastic as a raw material.

Chemical recycling: Reclaim chemical raw materials by chemically decomposing waste plastic.