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Production Process of Jamu Nano Teknologi PT AICI Cirebon. West Java, Indonesia

Arif Nurudin[1]
[1] Muhammadiyah Cirebon University, West Java, Indonesia, arifnurudin@gmail.com

Corresponding Author: Arif Nurudin

Abstract: PT. Autoimmune Care Indonesia (AICI) is an MSME engaged in the production of herbal medicines with nanotechnology formula particle size. Starting with the results of the lecturers' research inventory that failed to convince BPOM to issue its distribution permit, then a new formula was prepared according to BPOM standards and finally succeeded in obtaining its distribution permit. This study aims to determine the production process of nanotechnology herbs at AICI using observation methods. The results showed that the production process of PT Autoimmune Care Indonesia's nano technology herbal medicine with products in the form of capsules consists of the processing of raw materials and the processing of herbal medicine. The raw material processing process includes raw material handling, compounding, size reduction, sieving, and drying. The herbal medicine processing process includes IPC inspection, final products, quality control, and sanitation. Quality control consists of checking no batch/production code, degree of fineness (< 1000 nanometers), and weight uniformity. Sanitation consists of sanitation of rooms and equipment, sanitation of employees, and waste treatment. Guidance and supervision are carried out by BPOM West Java Province intensively.

Keywords: Process, Production, Herbal Medicine, Nanotechnology, AICI.

INTRODUCTION

Jamu is generally used by the people of Indonesia as a natural medicinal drink to maintain health and cure various diseases. The tradition of drinking herbal medicine is estimated to have existed since 1300 AD and is a historical drink. Jamu is a nutritious drink from Indonesia as a health drink, preventing, and treating various diseases (Indonesian.go.id, 2019).

Production is an activity to increase the value of an object has added value with inputs in the form of production factors so that the output becomes a product. The inputs are in the form of raw materials, labor, production equipment, and production information. (Suherman et al, 2023). Processing herbal medicine is not too complicated, most only take the juice from the juice of herbal plants. There is also with pounded. Often made from turmeric, ginger,

galangal, ginger, kencur, and cinnamon. Especially Javanese sugar, rock sugar, and lime are usually used as enhancers of fresh taste and sweetness. Uniquely, in making herbal medicine is also adjusted the dose of each ingredient, temperature, length of pounding or boiling, and others.

If not considered properly, it will lose the efficacy of its ingredients and can even harm the body. Likewise, with its development, the tradition of drinking Jamu experienced ups and downs according to its era. Broadly speaking, it is divided from the pre-historic era when the processing of forest products was rife, the Japanese colonial era, the early days of Indonesian independence, to the present. Indonesian people since the time of the Mataram Kingdom until now still use Jamu. This typical Indonesian drink has become its pride as well as Ayurveda from India and Zhongyi from China. Since then, women have played a more important role in producing herbs, while men have a role in finding natural herbs. This fact was reinforced by the discovery of Cobek and Ulekan artifacts – mashing tools for making herbs.

The artifact can be seen at the Liyangan archaeological site located on the slopes of Mount Sindoro, Central Java. In addition to Cobek and Ulekan artifacts, other evidence was also found such as herbal medicine-making tools found in Yogyakarta and Surakarta, precisely at Borobudur Temple on the reliefs of Karmawipangga, Prambanan Temple, Brambang Temple, and several other locations. It is said that in ancient times, the secret of the health and magic of warriors and royal officials came from training and assistance from herbal ingredients (Widyani et al., 2022).

Along with its development, the tradition of drinking Jamu decreased. Precisely when modern science first entered Indonesia. At that time, the certified medicines campaign successfully changed the mindset of the Indonesian people so that interest in herbal medicine decreased. In addition to standards or certificates, the efficacy of herbal medicine is also questionable. During the Japanese colonial period, around the 1940s, the tradition of drinking Jamu was again popular because of the establishment of the Indonesian Jamu Committee. That way, the efficacy confidence in herbal medicine increases again. Over time, the sale of herbal medicine has also adjusted to technology, including many have been packaged in the form of pills, tablets, or instant powder that is easy to brew. At that time it clashed with the declining condition of Indonesian agriculture which resulted in the shift to the industrial world including the Jamu industry

From 1974 to 1990 many herbal medicine companies were established and growing. In that era, there were also many pieces of training and assistance from the Government so that Jamu industry players could increase their production activities. Since the first time Indonesian people used Jamu as a health drink until now, the processing of Jamu is based on science that is taught from generation to generation. But nowadays, the tradition of teaching Jamu making has rarely been carried out, so the sale of Jamu gendong is rarely found. Nowadays, fewer and fewer young people want to learn how to make herbal medicine. Most of them think to get Jamu simply by utilizing Jamu which is sold sachets and instant. Please note, Jamu is believed to come from two Old Javanese words, Djampi which means healing, and Oesodo which means health. The term herbal medicine was introduced to the public through people who were believed to have traditional medicine. Must not be certified, the efficacy of herbal medicine has been tested over time for generations used as traditional medicine. So until now, this typical Indonesian nutritious drink has always been maintained. The heritage of ancestors is maintained at any time (Indonesia.go.id, 2019).

The process of making traditional herbal medicine requires several stages that must be done specifically and thoroughly. Starting from choosing the type of plant, washing, sorting, and drying to storage everything must be done properly. Herbal medicine like modern

medicine also has various dosage forms, including powders, pills, capsules, liquids, and bachelors. The process of making herbal medicine also varies depending on the desired dosage form.

LITERATURE REVIEWS

The development of the herbal medicine production process

Traditional herbal medicine making is generally done by pounding ingredients in dies or using pee. After the ingredients are smooth, then enough boiled water is added to facilitate watering and squeezing. Then, the filtered water can be drunk directly.

Herbal decoction must first be boiled. Previously, the thoroughly washed ingredients were added to water in a saucepan and boiled to a boil. Boiling is carried out until the remaining cooking water is only half. Boiled water is cooled, filtered, and ready to drink. When the herb must be powdered, the ingredients must be cleaned and dried first. All ingredients are ground and mixed then sifted. The result of this powder is then brewed with enough boiled water and ready to drink.

1. Meanwhile, the way of making modern herbal medicine includes several stages, starting from the preparation of raw materials, compounding, and packaging. The process of preparing raw materials itself also has several stages until raw materials from nature are ready for use. Raw materials from farmers/traders
2. Quality inspection laboratory; Checking the authenticity of the material, the purity of the material, the moisture content, and the content of the active compound.
3. Raw material warehouse
4. Simplisia is cleaned (using a blower), washed, and sorted to sort dirt, items that have suffered physical damage, and useless parts of Simplisia.
5. Lengthening is done to obtain a smaller size to speed up the drying process.
6. Drying should look at the properties of the material to determine the drying time and temperature.
7. Prebroken Dry Simplisia is further processed to obtain the same size to facilitate further processing.
8. Dried simplistic is stored in the Mixed Warehouse and ready to be processed.

Compounding process:

1. Raw material weighing
2. Compound ingredients according to the formulation
3. Milling of raw materials (dry simplistic) into powder form (coarse grinding, fine grinding).
4. Sieving with a sieving machine to obtain the expected degree of fineness.
5. Storage of fine powder in the Semi-Finished Warehouse is to be continued with packaging and further processing.

Packaging process:

1. Quality testing of finished fine powder before the packaging process.
2. Fine powder can be directly packaged or made into other dosage forms (pills, capsules, caplets, semi-solid preparations, and liquids).
3. The extraction process can also be done on fine powder to obtain extracts from active compounds.

CPOTB (Good Manufacturing Practices)

Identification of the stages of a good herbal production process according to CPOTB standards, archives of production process data, types of activities and information, and making production process schedule algorithms according to CPOPB standards using network analysis of Project Evaluation and Review Technique (PERT) and Critical Path

Methos (CPM) for caplet herbal entrepreneurs have been carried out (Oktaviana and Maharesi, 2011).

The results of research on caplet herbal producers show that the stages of quality control start from the preparation of simplistic (herbal raw materials) to the packing process. The basis for granting COPTB certification is the implementation of the model by including variable data inputs in the form of processing time, amount of resources, and costs per activity to be processed into information about the distribution and total time, resources, and costs.

METHODS

The study used the observation method and was conducted at PT Autoimmune Care Indonesia (AICI) on Jalan Saladara No 18, Cirebon City, West Java, Indonesia. Observation is direct observation carried out on processes that the company is allowed to observe and record and document all necessary data.

RESULTS AND DISCUSSION

General conditions of the company

Brief history and development

PT Autoimmune Care Indonesia was established on January 31, 2017, by Retno Widyani to facilitate the results of lecturer research into the industrial scale and have economic value. However, it was not easy to be able to pass the results of the research until the process of obtaining a BPOM distribution permit. A strong scientific publication foundation is needed to convince BPOM as the regulator of drug and food supervision in Indonesia, so that the formulation of lecturer inventors fails and there is a change in company data on April 30, 2019. Commissioners and directors made a new formula that was adjusted to BPOM standards and after struggling for 2 years in the pandemic era, One by one herbal formula products are out of circulation and can be sold freely and safely to contribute to the field of Health in the country.

Raw material processing process

Raw materials are imported from suppliers who have been certified by BPOM in the form of extracts. The type and amount of extracted raw materials supplied depend on management policies and market demand for certain formulas. Formula production depends on demand.

Raw material handling

Raw materials are received by the Pharmacist in Charge to check the authenticity, purity of raw materials, moisture content, and content of efficacious substances, the distinctive aroma in simplistic extract and coarse/fine extract.

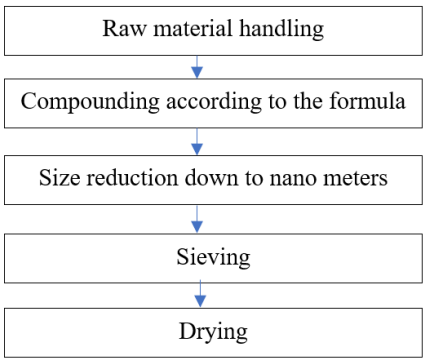

Figure 1. Raw material processing process

The requirements for simplistic extract raw materials that can be accepted by the company in this laboratory examination are 10% moisture content, purity of ingredients, chemical content, bacterial or fungal examinations must be minimal and pathogens must be negative, and there is no adulteration of materials. Raw materials enter the stock warehouse.

Compounding

Compounding is the process of mixing or concocting herbs with a certain composition and different according to the type and type of herbs to be made. Compounding of raw materials is carried out based on orders from the production department according to plan.

Compounding of raw materials is carried out according to the herbal formula to be made. The herbal formula is obtained from the receptor section located in the Palur production unit and only in the form of a number code. The coding is intended to maintain the confidentiality of the herbs that have been concocted. Compounding orders are carried out once a week to rotate raw materials that are still available in the warehouse.

The raw material turnover system applied is the FIFO (First In First Out) system, which means that the first material to enter the warehouse will come out first. The flow in the process of compounding ready-to-mix ingredients from a clean warehouse will be weighed according to the order of herbs that are formulated and then the arrangement of the concoction results in the ready-to-grind blending warehouse.

For example, compounding Dyospiros *kaky, Avium grafeolens, Guazuma umnifolia, Hibiscus sabdarifa* as an agent of anti-cholesterol (Widyani, 2020) or *Andropogus panniculata, Piper bettle, Zingiber officinale* and *Myristica fragrans* (Widyani, 2019).

Size reduction

Size reduction aims to meet material uniformity standards and to facilitate subsequent processes. Size reduction is done so that the material has the same size. The size reduction process uses a pre-broken machine and a chopper machine (crushing).

Starting from the production demand, then the deviation is carried out for each extract according to the formula to be produced. Then mixing the extract is carried out. Then sieving is carried out. Size 100 mesh. Then blend until smooth with a particle size below 1000 nanometers.

Sieving

Products that have just come out of the milling machine material are still hot. Thus, to go to the sieving process the output product must be allowed to stand for a while (about half an hour) to cool. Furthermore, the output product is just carried out through the sieving process.

This sieving process further aims to homogenize the degree of fineness that meets the requirements of nanotechnology, namely the particle size of 1-1000 nm. (Widyani et al., 2023). The sieving size used in this process is 100 mesh.

Drying

Drying the simplistic extract formula is carried out to remove water by heating it in such a way that it reaches a certain water content. Drying is done using an artificial drying system (drying with a drying machine), namely by using a rack-type machine

whose function is to dry thermolabile materials, namely materials that contain volatile components at high temperatures and materials that experience color changes when heated

with sunlight. The drying temperature used in thermolabile materials is at a temperature of 60ºC-70ºC, for 15-30 minutes.

Herbal medicine processing process

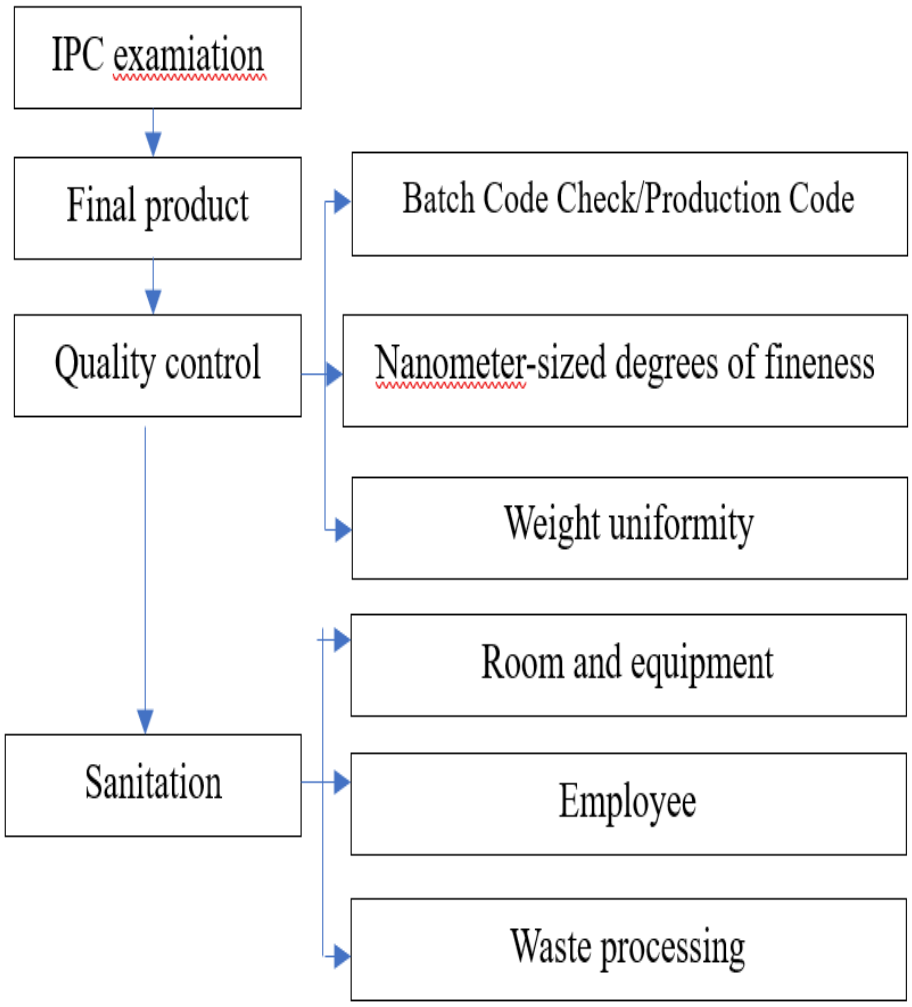

Figure 2. Herbal medicine processing process

IPC Examination

Before continuing to the next process, these semi-finished herbs are sampled first to be examined in the IPC (In Process Control) room. The inspection includes semi-finished products and finished products.

Final product

The final product of AICI formula is in the form of capsules. Each formula has a different capsule color. After the formula is inserted capsules, primary packaging and secondary packaging are carried out, and the finished product is put in the finished product warehouse for later market.

The capsule formula produced by AICI is to maintain and treat body system disorders with a composition of simplistic extract for anticholesterol (Widyani, 2019), immunity, blood sugar, gastric disorders, urological disorders, liver function disorders, cancer, HIV, respiratory disorders (Widyani and Putri, 2022).

Figure 3. Autoimuncare Product

Quality control

The main purpose of quality control is to determine the efficiency that has been achieved by a factory in carrying out the production process. In addition, it is also to control the course of the production process so that if there is a deviation, corrective actions can be taken quickly. Quality control is carried out by BPOM West Java Province which often conducts SIDAK. Quality control starts from the main raw materials, auxiliary raw materials, processes, semi-finished materials (herbal products), and packaging materials.

Batch number and production code check

The provision of batch numbers is carried out by giving digit numbers that will be converted into letters by the production department. The digits used are 6 digits while the production code is carried out by the production

Degree of smoothness

The goal is to see the fineness of the resulting herbal powder. You do this by using a 100 mesh sieve and weighing a sample of 5 grams and sifting. The remaining unfiltered material is weighed again and the percentage degree of fineness can be calculated, at least 90% of which passes. Standard particle nanosize 1-1000 nm (Widyani et al., 2023).

Weight uniformity

The tool used is the "Sartorius analytical scale", taking several samples of tablets or pills from the printer and then weighing and calculating the average weight. If there is a deviation, it is immediately reported to the production process

Sanitation

Room Sanitation and Machine Equipment

Sanitation of production rooms is carried out daily by employees. Cleaning is carried out daily. Sanitation of machinery and equipment, production equipment is periodically cleaned along with machine maintenance at least once a month. The machine after use is cleaned with a vacuum. For cleaning of walls and ceilings is carried out once a week.

Employee Sanitation

Equipment worn by employees includes hair covers, work clothes, masks, and gloves. During work, employees are required to wear footwear in the form of flip-flops that have been provided by the company. The difficulty experienced by companies is that if supervision

is less strict, employees often do not want to wear their work equipment for various reasons such as heat, making it difficult to breathe, troublesome, and others

Waste

Other waste produced is dust, dirt from raw materials, and herbal powder blown by the wind. For this reason, the sieving section has been equipped with an air filter bag so that it can reduce dust pollution. For dust outside the grinding part is cleaned with a vacuum cleaner

Figure 4. Photo of the production process at PT Autoimmune Care Indonesia Cirebon West Java Indonesia

CONCLUSION

1. PT Autoimmune Care Indonesia was established as an effort to utilize the results of the lecturer research inventory. However, it failed to obtain a BPOM distribution permit because the scientific basis for publication was weak. Furthermore, make a new formulation following BPOM standards and successfully obtain a distribution permit.

2. The production process of PT Autoimmune Care Indonesia's nano technology herbal medicine with products in the form of capsules consists of the processing of raw materials and the processing of herbal medicine. The raw material processing process includes raw material handling, compounding, size reduction, sieving, and drying.
3. The herbal medicine processing process includes IPC inspection, final products, quality control, and sanitation. Quality control consists of checking no batch/production code, degree of fineness (< 1000 nanometers), and weight uniformity. Sanitation consists of sanitation of rooms and equipment, sanitation of employees, and waste treatment.
4. Guidance and supervision are carried out by BPOM West Java Province intensively.

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