



RECYCLING OF MEDICATED OILS AND GHEE

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Abstract :

INTRODUCTION:

Ayurveda science uses different Sneha dravyas (oils and ghee) for the treatment purpose in various ways. As per hazardous waste rule 2008, used oil and waste oil has been categorised as hazardous waste. Used Sneha and expired taila and gritha which can't be used for medicinal purpose should be discarded carefully and then should be recycled.

AIM AND OBJECTIVE:

- To facilitate safe disposal of oils and ghee products
- To find ways of reusing and recycling medicated oils and ghee products and to reduce environmental hazard

METHODOLOGY:

The methodology used for review of literature is data mining carried out from various peer reviewed journals and some websites of the concerned subjects.

SOURCES AND MEASURES OF RECYCLING:

Sources of production of waste medicated oil and ghee include hospital setups, pharmacies and consumers. Usually these oils and ghee are discarded either by pouring through drains, landfilling or incineration. These methods cause hazards like clogging of drains, contamination of water bodies, soil and air pollution.

These oils and ghee can be reused and recycled by distillation process to produce bio fuel and its byproducts.

These oils can be reused in production of soaps, herbicides, fertilisers, feedstock, cosmetics etc

DISCUSSION:

Recycling of medicated oils and ghee by various methods like distillation and conversion into biofuel, there disposal by measures of safe packing, incineration etc are to be adopted to reduce the amount of waste production, by reusing and recycling measures. It can also be repurposed by ayurvedic murchana process.

IndexTerms - Ghee, Oil, Recycling, Reuse.

I. INTRODUCTION

Ayurveda is a traditional science of treating the roga and rogi using holistic methods. One of the unique treatment modalities used in Ayurveda is Panchakarma. This branch of science uses different Sneha dravya (fat preparations) for the treatment in various ways. Ayurvedic and panchakarma facilities produce a lot of Sneha Dravya as waste products. Apart from the used Sneha produced as a waste, stale and expired taila and gritha which can't be used for medicinal purpose should be discarded carefully and then recycled.

As per the Hazardous Waste (Management, Handling and Transboundary Movement) Rules, 2008 (HW Rules) any waste which by reason of any of its physical, chemical, reactive, toxic, flammable, explosive or corrosive characteristics causes danger or is likely to cause danger to health or environment, whether alone or when in contact with other wastes or substances is termed as Hazardous waste. As per hazardous waste rule 2008, used oil and waste oil has been categorised as hazardous waste.

So, it is necessary to recycle and reuse these oils and ghee preparations.

AIM AND OBJECTIVE:

- To find ways of reusing and recycling medicated oils and ghee products.
- To provide safe measures of discarding the used and expired oils and ghee products.
- To find ways to reduce environmental hazard caused by these products.

METHODOLOGY:

The methodology used for review of literature is data mining carried out from ayurvedic classical literature, various peer reviewed journals and some websites of the concerned subjects.

SOURCES -

The used medicated oils and ghee from the ayurvedic hospital setups and expired oils and ghee from the household or pharmaceutical setups together constitute the oil and ghee waste.

NECESSITY FOR RECYCLING OF SNEHA DRAVYA-

The used medicated oils and ghee should be discarded with care and should not be poured down the sinks and drainages as they may cause various environmental hazards. They may even clog the drainage system incurring financial loss in several ways.

Environmental hazards include-

- Turning into toxic products.
 - Forming products that don't decompose easily and pollute the environment for years.
 - Corroding concrete and metals and polluting the groundwater.
 - Contaminating current and future sources of water and food for wild and domestic animals.
 - Coating aquatic plants and animals in oil, causing them to die of suffocation due to oxygen depletion.
 - Coating wildlife in oil, causing them to die of starvation, hypothermia, diarrhoea, and dehydration.
 - Blocking pipes and sewers, causing backups, leaks, and overflows of contaminated water.
- Contaminating seashores and water treatment plants, becoming a fire hazard due to the flammable oils.

OBJECTIVES OF RECYCLING

Reprocessing involves the recovery of used oil and its re-conversion into top quality oil that can be used in production processes. Three objectives are achieved with this type of action

- There is a considerable reduction in the quantity of used oil that is considered waste.
- Savings are made in the purchase of new oils.
- The life cycle of the oil is extended with reprocessed oil being reintroduced into same production cycle.

ADVANTAGES OF RECYCLING

- Conservation of valuable oil reserves.
- Significant saving of foreign exchange.
- Checks environmental degradation and saves ecology.
- Recycling reduces the burden on storage and disposal facilities.
- Recycling also leads to significant reduction of carbon foot print.

MEASURES FOR SAFE DISPOSAL OF OILS AND GHEE**DONT'S**

- Don't pour used oil down the sink, toilet, or dishwasher. This will clog the drains eventually.
- Over time, dumping used oil down drains will make it accumulate into a mass called a **fatberg**.
- It will gradually solidify and turn into a gel, producing a foul odour and causing blockages and backups.
- Don't throw out hot oil in the garbage. This will attract a lot of vermin like bugs and mice.
- Don't leave used oil by the curb side or use plastic bags for disposal of used oil as they aren't strong enough may lead to leaks, making it flammable.

DOS

- Pour the oil into a separate disposable container before getting rid of it.
- Ensure that the disposable container is properly sealed so that the oil doesn't spill out into the remaining garbage.

WAYS TO REUSE USED OIL

- Oil in small quantities can be used to make weed killers or insecticides for garden.
- Oils in large quantities can be subjected to ultrafiltration to use as fuel or use a chemical conversion process to produce biodiesel.
- FOG (Fat, Oil and Grease) is also used as a raw material for the petroleum industry to produce fertilizers, feedstock, and other household products like soaps and cosmetics.

PROCESS OF RECYCLING

- Collect the oils and ghee from the hospitals and pharmacies.
- This is subjected to a process which purifies used oil meticulously removing impurities and contaminants. This produces high-quality lubricant base stock, which serves a multitude of purposes, from lubricating automotive engines to industrial machinery, offering a sustainable alternative to virgin oil production.
- **Fuel Blending:** Used oil can be strategically blended with existing fuels like diesel or heating oil, creating a new and usable fuel source. By incorporating recycled oil, this method reduces reliance on fossil fuels and promotes energy efficiency. It, mitigates impact on environment.
- **Beyond Lubricants and Fuels:** The versatility of used oil extends far beyond lubricants and fuels. Through specific processing techniques, it can be transformed into asphalt, the essential ingredient for roads. Alternatively, it can serve as a feedstock for industrial heating applications, providing a sustainable fuel source for various industrial processes.
- Re-refining maximizes the intrinsic value of the oil, offering a near-identical replacement for virgin oil.
- Fuel blending provides a readily usable energy source, directly contributing to reduced reliance on fossil fuels.

Technologies employed for recycling used oils-

Spent oil has been classified as RED category (highly polluting) therefore the recyclers require registration for recycling or reprocessing of these wastes. The registration of recyclers ensures that environmentally sound technologies (EST) are adopted in recycling of HW which includes waste/ used oil.

CPCB (Central Pollution Control Board) with the support of Ministry of Environment & Forests published Guidelines for Environmentally Sound Recycling of Hazardous Wastes. The guidelines approved the following ESTs for used oil:

- **Vacuum distillation with clay treatment-**

- In this step, the used oil is heated under reduced pressure (vacuum) to separate its components based on their boiling points. Lighter hydrocarbons (such as gasoline and diesel) vaporize and are collected, leaving behind heavier fractions.
- After vacuum distillation, the lube oil undergoes clay treatment. Activated clay adsorbs contaminants like oxidation products, metals, and other unwanted substances.
- The treated oil becomes cleaner and more suitable for reuse.

- **Vacuum distillation with hydro-treating-**

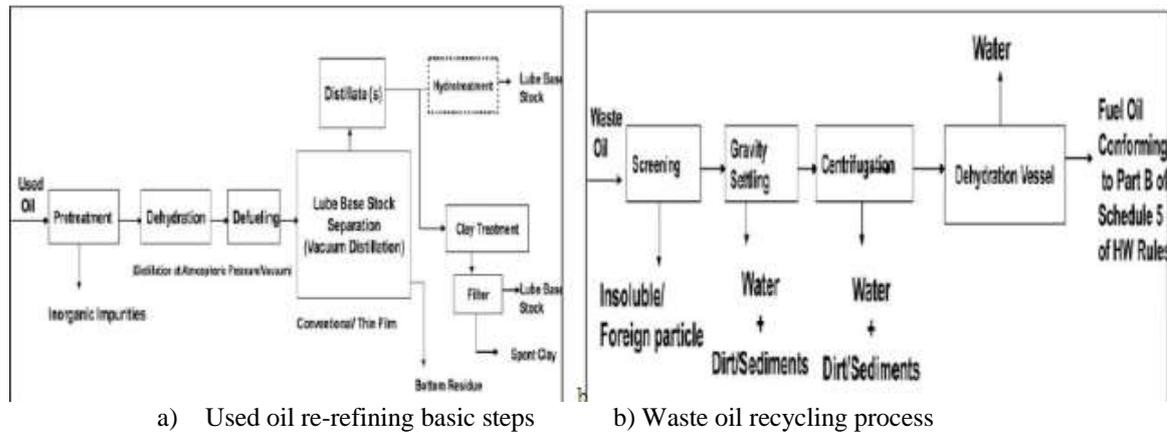
This process removes impurities such as sulfur, nitrogen, oxygen, and metals, which can affect the quality and performance of the final products. Hydrotreating is particularly important for meeting environmental regulations by reducing sulfur content in fuels.

- **Thin film distillation-**

It is a highly efficient technique used to separate volatile components from less volatile ones in a mixture. This method is particularly useful for processing heat-sensitive and high-viscosity materials.

- EST for waste oil essentially includes centrifuging and dehydration of water and reducing the sediment to the desired level.
- Any other EST other than that given in the guidelines may be adopted only with the approval of CPCB.

STEPS



- **Collection & Storage:** Oil is collected and stored in secure storage tanks, designed to prevent leaks and safeguard against contamination.
- **Pre-treatment:** The oil is subjected to a purification process. Impurities like water, metals, and sediments are removed through filtration and other specialized techniques, preparing the oil for the next stage.
- **Distillation & Purification:** This is the main step of the operation; it involves a complex chemical process that separates the oil into different fractions. Tailored to the desired end product, this removes remaining contaminants, leaving behind a purified base.
- **Blending & Final Product Storage:** Depending on the chosen recovery method, the purified oil takes its final form. In some cases, it may be blended with other ingredients to create specific products like lubricants or fuels. Alternatively, it might be directly stored as the final product, ready for distribution and use in various applications.
- **Environmental Responsibility at the Core:** Modern recycling plants operate with environmental responsibility at their core. Emission control systems diligently minimize air pollution, ensuring clean air emissions. Additionally, waste water treatment facilities process and dispose waste water generated during the processes, safeguarding the environment from harmful impacts.

Encourage recycling

- **Innovation:** The emergence of new technologies like advanced filtration and bioremediation presents exciting possibilities for more efficient and sustainable oil recovery. These advancements not only have the potential to increase resource recovery but also to minimize environmental impact throughout the process.
- **Sustainability Focus:** Growing global awareness of environmental responsibility is driving increased investment in recycling infrastructure and technology. Governments, businesses, and individuals are increasingly recognizing the importance of sustainable practices, leading to dedicated funding and support for the development and adoption of innovative recycling solutions.
- **Collaborative Efforts:** Collaboration between diverse stakeholders, including government agencies, industry leaders, and individual citizens, is vital to create a comprehensive and effective waste oil management system. By fostering partnerships and collaborative efforts, we can create a robust ecosystem that promotes effective collection, responsible processing, and widespread adoption of recycled oil products.

AYURVEDIC CONCEPT OF SNEHA MURCCHANA

- Sneha murcchana is a unique procedure carried out on raw sneha before subjecting it to 'sneha kalpana'.
- The concept of murcchana is found in Dipikā commentary of Samgadhara which was written in later parts of 14th century.
- Bhaishajya Ratnāvalī deals in detail about the 'sneha murcchana' concepts of ghee and different oils used for therapeutic purpose.

- However, the primary intention of performing sneha murcchana is to remove āma dosa from raw sneha and render ready absorbability of medicinal properties in it from the drugs with which it is processed.
- So murcchita sneha incorporates the medicinal properties far better than raw sneha processed without murcchana procedure.
- Through this process the following objectives are achieved
 1. Impurities are cleared
 2. Offensive odor is removed (Durgandhata)
 3. Amadosha is removed
 4. Ugrata is nullified
 5. Potency of the Sneha is enhanced
 6. Efficacy is augmented
 7. Good colour and pleasant smell are imparted
 8. Gets capability to receive more active principles
 9. Toxic effects of crude form of Sneha are removed and Sneha gets refined.

MURCHHANA SIGNIFICANCE IN REPURPOSING OF MEDICATED GRITHA AND TAILA

- Free fatty acid in fat promotes microbial growth and decreases the shelf life of fat.
- Murcchana helps in maintaining the necessary ratio of unsaturated and saturated fats suitable for human physiology.
- Stale sneha dravya develops ama i.e. found to have increased rancidity and saponification values which can be reduced by the method of murcchana.
- By the above discussed points, the concept of murcchana can be adopted for the purpose of recycling of the stale medicated gritha and taila and can be reused for the medicinal purposes or they can also be introduced into the fresh production lines for repurposing.
- Hence there is a huge scope of research in this field to enable ayurvedic fertility to use this murcchana process for the recycling of the Sneha dravya in a traditional and organic methods.

DISCUSSION-

Ayurvedic facilities and setups produce medicated oil and ghee as waste material which contributes to hazardous waste. This waste oil and ghee causes various environmental and health hazards. To prevent these hazards safe disposition of oil should be carried out which includes measures like avoiding pouring oil into drains to prevent clogging, disposing them in a sealed container to prevent spillage.

Once the oils and ghee are collected these are subjected to methods of recycling like purification, distillation and converting them into biofuel or can be blended and converted into lubricants.

Murchana an ancient samskara of Sneha dravya mentioned in classics to make Sneha dravya fit for therapeutic administration can be adopted for the repurposing purpose in an organic way.

CONCLUSION

Hence recycling and reuse of the medicated oils and ghee should be encouraged and carried out for effective use of spent and waste oils and to prevent environmental hazards.

It is need of time to look into this process of recycling and repurposing of Sneha dravya. Ayurvedic community should be enlightened about the need of recycling of Sneha dravya and encouraged to implement these methods of recycling.

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