

Counterfeit Medicine

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Abstract

Objective: To study the prevalence of counterfeit medicine and factors influencing it.

Methodology: Articles published in indexed journals were reviewed. Database used were PUBMED, MEDLINE and EMBASE.

Results : The major factor associated with counterfeit medicine is absence of strict rules and regulations in drug supply chain.

Conclusion: The problem of counterfeit is prevalent in our country and is increasing. Strict vigilance and proper implementation of law is required to prevent it..

Keywords: counterfeit medicine, IMPACT, CDSCO

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I. Introduction

The origins of counterfeiting

- The word “counterfeit”, which comes from the Latin *contrefacere* meaning “to imitate”¹.
- Legally, “counterfeiting is a means by which the counterfeiter creates confusion between the original product and the counterfeit product at the expense of the party who owns the intellectual property rights”

Counterfeiting, an age-old crime

A document dating back to the 2nd century BC talks of an illiterate Gallic winemaker who attempted to sell his wine as a fine Italian vintage. He copied the letters that traders would inscribe on the stoppers of amphorae containing the wine. His work was so clumsy, however, that he was soon caught out. The stopper can be seen today in the counterfeiting museum in Paris.²

According to WHO

“Counterfeit medicine is one which is deliberately and fraudulently mislabeled with respect to identity, composition and/ or source. Counterfeit product may include products with the correct ingredients or with the wrong ingredients, without active ingredients, with insufficient active ingredients or with fake packaging”³.

According to FDA

“Counterfeit medicine is fake medicine”.

Counterfeit products may include:

- A. with the correct ingredients but fake packaging [15.6%]⁴
- B. with the wrong ingredients [21.4%]⁴
- C. without active ingredients [32.1%]⁴
- D. with insufficient active ingredients [20.2%]⁴
- E. High level of impurities and contaminants [8.5%]⁴
- F. An original product that has been copied [1%]⁴

Prevalence of counterfeit medicine

- Most developed countries with effective regulatory systems and market control (e.g. USA, EU, Australia, Canada, Japan, New Zealand) currently have a very low proportion, i.e. less than 1%⁵.
 - Many developing countries of Africa, parts of Asia, and parts of Latin America have areas where more than 30% of the medicines on sale can be counterfeit⁶.
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- Medicines purchased over the Internet from sites that conceal their actual physical address are counterfeit in over 50% of cases⁷.
- The percentage are worse in certain areas:
 - a. 38% in Southeast Asia
 - b. 48% in Africa
 - c. Recent study of pharmaceuticals on sale in Nigeria's capital found that 80% were fake and 7% contained dangerous ingredients⁸.
- India is the world largest manufacturer of generic drugs, has become a busy center for counterfeit and substandard medicines.
- Global fake drug industry worth about 461 billion dollar⁹.
- These counterfeit medicine lead to annual death of almost 1 million people a year and contribute to rise in drug resistance.
- The number of people arrested for manufacturing and selling fake drugs rose from 12 in 2006 to 147 in 2015¹⁰.

Factors influencing the prevalence of counterfeit medicine

1. Weak or absent drug regulatory authority.
2. Absence of a legal mandate for licensing of manufacture/import of drugs.
3. Lack of regulation by exporters within free trade zones
4. Proliferation of small pharmaceutical industries
5. Complex transactions involving many intermediaries high demand for curative and preventive drugs and vaccines exceeding supply.
6. High prices and inefficient cooperation among stakeholders.
7. Lack of GMP in local pharmaceutical industries in developing countries due to frequent power cuts and shortage of water.

Consequences of counterfeit medicine

1. Lack of effect & treatment failure
 2. Bacterial resistance
 3. Toxicity & side effects
- * All of these contribute to burden of disease and consequently to excess mortality and morbidity.

Tragedies caused by counterfeit medicine

1. The consumption of Paracetamol cough syrup prepared with Diethylene glycol led to 89 deaths in Haiti in 1995 and 30 deaths in India¹¹.
2. 192,000 patients killed by fake drug in china alone in 2001¹²
3. In 1999 at least 30 people died in Cambodia after taking counterfeit antimalarial prepared with Sulphadoxine-Pyrimethamine which were sold as Artesunate¹³.
4. In 2001 a study conducted in South-East Asia revealed that 38% of 104 antimalarial drugs on sale in pharmacies did not contain any active ingredients and had resulted in number of preventable deaths¹⁴.
5. One million deaths occur from malaria annually of which 200,000 deaths would be avoidable if the medicine available were effective, of good quality and used correctly¹⁵.

Examples of counterfeit medicine

1. Three batches of counterfeit Procrit [epoetin alpha] by ortho biotech, found march 2003. Product contained no active ingredients.¹⁶
2. Ponstan is an antiinflammatory product. This counterfeit was found in Columbia contain yellow powder, it consist of boric acid, floor wax, highway paint¹⁷.
3. More than 18 million counterfeit Lipitor tablet were removed from the supply chain in 2003. Counterfeiting was only distinguishable to the consumer by bitter taste¹⁸.

Status of Counterfeit drugs in developing countries

Counterfeiting thrives in developing countries because of :

1. High cost and limited resources
 2. Black market operations
 3. Lack of infrastructure and technical expertise to regulate and policy criminal activity.
 4. Corruption and price control.
- A study conducted in 2004 found that 53% of the antimalarial drugs sold in South-East Asia are counterfeit medicine¹⁹.

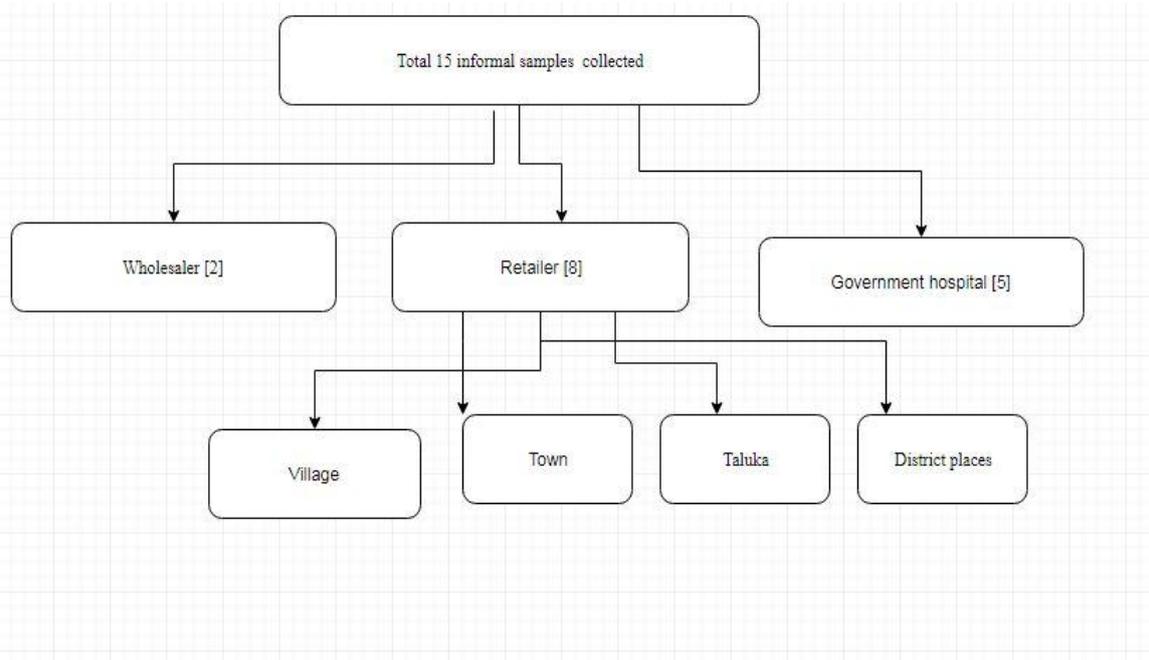
- The situation is worse in African countries, in Nigeria 85% of chloroquine tablets are ineffective and in many other African countries more than 50% tablets are ineffective²⁰.
- Suspected Coartem from Cameroon were provided via Novartis and INTERPOL in 2010. These consisted of blisters of six tablets, labelled as made in 2008, containing no artemether-lumefantrine, but containing pyrimethamine and sulphadiazine²¹. This suggests that the criminals producing them differed from the counterfeiters operating in Ghana or that they changed their packaging in response to changes made by Novartis.

Status of Counterfeit drugs in developed countries

- United states drug supply is among the most secure in the world and it is also affected to counterfeits by obtaining the drug through unregulated channels and due to sophistication of counterfeit drug ring.
- WHO estimates that 5% to 7% of all drugs sold in united states have been tampered with mislabeled or otherwise fraudulent²².
- It is estimated that 15% of counterfeit sales in European countries²³.
- 20% of European admitted in hospital are purchasing prescription drugs without prescription.²⁴

Evaluation of counterfeit medicine

In order to assess the quality of drugs moving in the supply chain, informal drug samples are required to be drawn from medical stores such as wholesalers, retailers, government hospitals where it is suspected that movement of counterfeits drugs may be more.



Samples are collected by:

1. Consumer association
2. Non- government organization

* Along with circle of drug inspector or assistant drug controller.

Precaution to be taken during sample collection.

- Quantity of sample taken must be from the same batch.
- Samples collected shall have at least 6 month remain to expiry.
- Minimum quantity of sample to be taken.
- Sample should not be taken out of original packaging.
- Medicine labels and package leaflets should not be removed or damaged.
- Sample collected should be kept under controlled condition as per label requirements.

Minimum quantity of samples required and tests adopted for different formulations.

Formulation	Quantity of sample required	Tests adopted
1. Tablets /Capsules	30-40	Description , Identification, Assay, Disintegration
2. Dry powder/liquid injections [small volume parenteral 30 ml]	6	Description, identification, assay, and pH wherever possible.
3. Liquid orals	100 ml	Description, Identification, Assay and pH wherever possible
4.Ointment/ creams/ gels	20 gm	Description, Identification, Assay and pH wherever possible
5.Ophthalmic and ENT liquid preparations/ointments/creams	4 samples	Description, Identification, Assay and pH wherever possible

- Problem of counterfeit medicine was first addressed at international level in 1985 at the conference of experts on the rational use of drugs in Nairobi.
- In February 2006 WHO proposed the establishment of international medical products anti-counterfeiting Taskforce [IMPACT]²⁵
- IMPACT aims to build coordinated networks across and between countries in order to halt the production, trading and selling of fake medicines around the globe.
- At national level central drug standards control organization[CDSKO] is the central drug authority to function against counterfeit.
- **The drug and cosmetic act 1940 and rule 1945**, which is a central piece of legislation regulates the manufacturing, packaging, labeling and sale of drug in India.

Methods for analysis of counterfeit medicine

1. Radio-frequency Identification (RFID)
2. Pharmacode/ Barcode
3. Raman spectroscopy
4. Overt
5. Covert
6. Forensic
7. Trace and track mechanism

Pharmacode / Bar code

- Also known as pharmaceutical Binary code.
- In Bar code the object and scanner should be in the line of sight.
- In this identification technology we put a bar code on each drug package with a unique electronic product code that is used all over the world.
- This technique is cheaper to install than RFID but operating is expensive as it would require manual scanning.

Raman Spectroscopy

- It is a non-invasive method for analyzing the counterfeit drugs while they are still inside their packaging.
- It works by interacting the laser light with molecular vibrations, photons other excipients results in shifting of energy which gives characteristic peak, which will help in make up of the compound.

Overt

Visible and immediately apparent security features on the packaging such as holograms, color-shifting ink or tamper-evident features.

Covert

Visible but not immediately apparent security features, often hidden features such as UV markers or micro batch codes.

Forensic

Extremely covert security measures that require special equipment to detect. It include embedded chemical tags that can be tested for, and elemental analysis to verify composition.

Trace and track mechanism

- The Drugs Technical Advisory Board approved a proposal for a “trace and track” mechanism during a meeting held on May 16.
- According to the proposal, a 14-digit number will be printed on the labels of the top 300 pharmaceutical brands and these numbers will be unique to each strip and bottle sold in the market. The labels will also come printed with a mobile number provided by the company marketing the brand.

Patients purchasing these medicines can message this 14-digit number to the contact number provided and will get details like the name and address of the manufacturer, the batch number, manufacturing and expiry date.

How to stop counterfeiting?

In November 2003 Drug and cosmetic act committee made certain recommendation:

1. Severe vigilance must be maintained with regular surprise checks.
2. Enhancement of penalty and prison terms from life imprisonment to death sentence.
3. Establish National Drug Laboratories with high quality of testing facilities.
4. Penalty to those who are unable to produce documents in support of purchase of drugs.
5. Constitution of special court for trial of offence under the drugs and cosmetic act so that judicial proceeding can be expedited.
6. There are no accessible testing services for fake drugs anywhere in the country so formation of a strong, well equipped central drugs standard control organization, which could be given the status of central drug administration.
7. Provision for compounding of minor offences so that, these should be disposed of expeditiously, while prosecution is able to concentrate on serious cases in appropriate courts.

II. Conclusion

1. Don't be tempted by cheaper prices or miraculous claims
2. Be aware that counterfeit medicines often look the same as genuine medicines, and differences can often only be detected through laboratory testing. Don't consider a medicine from an unauthorized source to be genuine just because it appears the same as the genuine product
3. Be aware of internet offers that sound too good to be true – if the medicine costs substantially less over the internet than at a pharmacy, if a prescription is not needed to purchase a prescription-only medicine, or if the website does not contain a physical address or contact details, the products being sold are likely to be fraudulent
4. If you are a consumer and believe that you may have a counterfeit drug, please contact the pharmacy where you received the medicine.
5. If you are a healthcare professional and believe that you may have a suspect counterfeit drug, please report to FDA's MedWatch office²⁶.
6. If you are aware of suspicious activity that may be associated with counterfeit prescription drugs, please contact FDA's Office of Criminal Investigations.
7. Consult with a doctor or other health professional before using the drug for the first time.
8. Always purchase medications from a pharmacy.
9. If going overseas, purchase medications in advance from pharmacy (be sure to check that you'll be able to take the medications with you or if there are any requirements such as carrying the prescription)
10. Do not purchase or use drugs if the packaging is soiled or damaged
11. Do not use drugs that have passed their expiry date.

Lastly beware of counterfeit medicine because even “A FAKE CROCODILE CAN MAKE YOU CRY REAL TEARS”.

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