Review Article

Marketed Formulations of Povidone Iodine: A Comprehensive Review

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ABSTRACT

Povidone iodine (PVP-I) is a widely used iodophor known for its broad-spectrum antimicrobial activity. It is a complex of iodine with polyvinylpyrrolidone that enhances iodine solubility and reduces toxicity. PVP-I is effective against bacteria, fungi, viruses, and protozoa, making it highly valuable in infection control. It is available in multiple marketed formulations such as solutions, ointments, scrubs, gargles, sprays, and medicated dressings. Each formulation is designed to optimize iodine release and therapeutic efficacy. This review discusses mechanism of action, formulation types, evaluation parameters, and recent advances in PVP-I delivery systems.

Keywords: Povidone iodine, iodophor, antiseptic, antimicrobial Activity, formulations, drug delivery.

INTRODUCTION

Povidone iodine is a well-established antiseptic used in pharmaceutical and clinical practice for infection prevention and wound management. It is a complex of iodine and polyvinylpyrrolidone, which acts as a carrier that allows gradual release of free iodine.[1] This controlled release minimizes irritation while maintaining antimicrobial activity.

Due to its wide spectrum and safety, PVP-I is used in surgical procedures, wound care, and oral hygiene applications.[2] Povidone Iodine is available in a number of pharmaceutical forms, such as solutions, ointments, surgical scrubs, sprays, powders, and gargles. These forms of the drug can be employed for specific needs depending on the type of infection. As a result of the drug's efficacy and accessibility, it is included in the list of essential drugs by the World Health Organisation.[3]

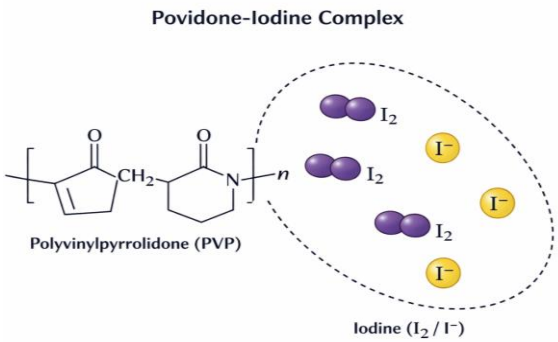

Figure 1: Structural representation of povidone iodine showing complex formation between polyvinylpyrrolidone and iodine.

Mechanism of Action

The antimicrobial activity of povidone iodine is due to the slow release of free iodine. The iodine penetrates microbial cells and disrupts essential biomolecules.

It acts through:

- Oxidation of proteins and enzymes
- Damage to nucleic acids
- Disruption of metabolic pathways

This leads to rapid microbial death and reduces resistance development.[4]

Advantages of Povidone Iodine

- Broad antimicrobial spectrum
- Sustained iodine release
- Reduced toxicity compared to iodine
- Low resistance development
- Suitable for skin and mucosa[4]

Types of Marketed Formulations

1. Topical Solutions

These formulations (10% w/v) are widely used for wound cleansing and surgical preparation. They provide rapid antimicrobial action[5].

2. Ointments and Creams

Semi-solid preparations (5–10%) are used for burns and infected wounds. They increase drug contact time and improve efficacy[6].

3. Surgical Scrubs

These contain PVP-I with detergents and are used for pre-operative hand and skin disinfection[7].

4. Gargles and Mouthwashes

Low concentration (~1%) formulations are used for oral infections and throat conditions[8].

5. Sprays and Aerosols

Sprays allow uniform drug distribution and convenient application for wounds[9].

6. Dusting Powders

Used for minor wounds; they absorb moisture and provide antimicrobial protection[10].

7. Medicated Dressings

Impregnated gauze provides sustained iodine release for chronic wounds[11].

8. Advanced Drug Delivery Systems

Modern approaches include hydrogels, films, and nanoparticles for controlled release[12,13]

Table 1: Comparison of Marketed Povidone Iodine Formulations[12]

Dosage Form	Strength	Use	Advantages	Limitations
Solution	10%	Skin disinfection	Fast action	Short duration
Ointment	5–10%	Burns/wounds	Prolonged effect	Greasy
Cream	5–10%	Skin infections	Easy application	Less occlusive
Scrub	7.5–10%	Surgical use	Cleansing + antiseptic	Dryness
Gargle	1%	Oral infections	Safe	Limited use
Spray	5–10%	Wounds	Uniform spread	Cost
Powder	Variable	Minor wounds	Absorbs moisture	Low penetration
Dressing	Impregnated	Chronic wounds	Sustained release	Expensive

Evaluation Parameters

1. Physical Evaluation

Includes color, odor, pH, viscosity, and homogeneity.

2. Chemical Evaluation

Includes iodine content, assay, and stability studies[13].

3. Microbiological Evaluation

Includes antimicrobial testing, zone of inhibition, and kill-time studies[14].

4. Stability Studies

Conducted under accelerated and real-time conditions[15].

Table 2: Evaluation Parameters of PVP-I Formulations[15]

Parameter	Test	Purpose
Physical	Appearance, pH	Stability
Chemical	Iodine content	Potency
Microbial	Antimicrobial tests	Efficacy
Stability	Shelf-life testing	Product quality

Factors Affecting Stability[16]

- pH
- Temperature and light
- Excipients
- Storage conditions

These factors influence iodine availability and formulation stability[17].

Marketed Brands

Common brands include Betadine, Wokadine, and Pyodine[18].

Limitations[19,20,21,22]

- Skin irritation
- Staining
- Reduced activity with organic matter
- Thyroid-related concerns

CONCLUSION

Povidone iodine remains a reliable antiseptic with wide applicability. Its availability in multiple formulations enhances its clinical utility. Advances in drug delivery systems continue to improve their performance and patient compliance.

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