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Formulation and Evaluation of a Biodegradable Polymeric Implant Containing *Pouzolzia wightii* Crude Extract for Potential Anticancer Activity

M. Syed Ali Fathima[1], Mohamed Ansar[2], Bensi P. S[3], J. Shifa Vanmathi[4], A.

[1]*Department of Botany,*
[2] *Department of Pharmaceutics,*
S.A. Raja Pharmacy College, Vadakkangulam.
[3] *Department of Public Health and Nutrition,*
[4] *Department of P.G Zoology,*
[1,3&4] *Sadakathullah Appa College (Autonomous), Tirunelveli – 627 011,*
[1,3&4]*Affiliated to Manonmaniam Sundaranar University, Abishekapatti,*
Tirunelveli – 627012, Tamil Nadu, India.
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KEYWORDS

Pouzolzia wightii; Medicinal plant; Crude extract; Anticancer activity; Biodegradable polymer; Polymeric implant; Controlled drug delivery; Sustained release; Extrusion method; Phytoconstituents.

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Abstract

Medicinal plants continue to provide valuable sources of bioactive compounds for pharmaceutical development, while biodegradable polymeric drug-delivery systems offer opportunities to improve the sustained release and localized delivery of therapeutic agents. *Pouzolzia wightii* (Urticaceae) is a medicinally important species whose phytochemical composition and biological activities warrant further investigation. The present study aims to formulate and evaluate a biodegradable polymeric implant incorporating a standardized crude extract of *Pouzolzia wightii* for sustained release and potential anticancer application. The present study was undertaken to formulate and evaluate a biodegradable polymeric implant containing crude extract of *Pouzolzia wightii* Benn. for potential anticancer drug delivery. The plant material was collected, authenticated, shade-dried, powdered and extracted using ethanol. The obtained crude extract was subjected to preliminary phytochemical screening to identify the major bioactive constituents. A biodegradable polymeric implant was prepared by incorporating the plant crude extract into a suitable biodegradable polymer matrix using the extrusion method. The prepared implants were evaluated for physical characteristics, extract content, swelling behaviour, degradation properties, mechanical characteristics, surface morphology and in-vitro release profile. The biodegradable implant was designed to provide sustained and controlled release of phytoconstituents, which may enhance the therapeutic potential of the plant extract while minimizing frequent administration. The study is expected to provide preliminary evidence for the development of a plant-based biodegradable implant using *Pouzolzia wightii* crude extract as a potential approach for localized and sustained anticancer therapy. Further in-vivo pharmacological and toxicological studies are required to establish its safety and therapeutic efficacy.

INTRODUCTION

Cancer remains one of the most challenging diseases worldwide because of its complex pathophysiology, therapeutic resistance and

adverse effects associated with many conventional chemotherapeutic agents (1,2). Consequently, considerable attention has been directed toward the discovery of novel natural products and the development of advanced drug-delivery systems capable of improving therapeutic efficiency while minimizing systemic toxicity (1,2,5). Medicinal plants represent an important reservoir of structurally diverse phytochemicals including phenolics, flavonoids, alkaloids, terpenoids and other secondary metabolites (11,14). These compounds have demonstrated diverse biological activities, and numerous plant-derived molecules have contributed to modern pharmaceutical development. However, crude herbal extracts often present challenges related to poor stability, limited bioavailability, rapid elimination and inconsistent release of bioactive constituents. These limitations create opportunities for integrating phytopharmaceuticals with biodegradable polymer-based delivery technologies. Biodegradable polymers such as polycaprolactone (PCL), polylactic acid (PLA) and poly (lactic-co-glycolic acid) (PLGA) have emerged as important biomaterials for controlled drug delivery because of their biocompatibility, controllable degradation behaviour (1,3-7) and ability to sustain the release of incorporated therapeutic agents. Recent reviews have highlighted their increasing importance in anticancer drug-delivery research, including sustained and localized delivery (1,2,5) approaches for plant-derived bioactive compounds. *Pouzolzia wightii* is a medicinal plant belonging to the family Urticaceae and is distributed in the Western Ghats of South India (15). Despite the ethnobotanical importance of *Pouzolzia* species, comparatively limited studies have investigated the pharmaceutical development of *Pouzolzia wightii* as a controlled-release formulation. In particular, the development of biodegradable polymeric implants containing standardized *Pouzolzia wightii* crude extract has not been sufficiently explored and therefore represents a promising area for interdisciplinary research involving botany, phytochemistry and pharmaceutical sciences. The present investigation is therefore designed to formulate and characterize a biodegradable polymeric implant containing standardized *Pouzolzia wightii* ethanolic extract. Lafarge pioneered the concept of implantable therapeutic systems for long term and continuous drug administration in 1861 with the development of subcutaneously implantable drug pellets (16,17). The technique was then improved and solid pellets containing crystalline hormones were prepared to mimic the steady and continuous secretion of hormones from the gland. Novel drug delivery system (NDDS) has gained a considerable attention from the last few decades. The reason for this paradigm shift is the low development cost and time required for introducing a NDDS, as

compared to a new chemical entity. In the form of NDDS, an existing drug molecule can get a new life, thereby increasing the market value, competitiveness and novelty in drug delivery. Implantable drug delivery system (IDDS) is an example of such systems available for therapeutic use. The present study was carried out with the following objectives:

1.Collection and authentication of the selected medicinal plant material and preparation of a suitable crude extract using an appropriate extraction method.

2.To reveal the formulation of biodegradable implants.

3.To screen the different parameters and sustained release property etc.

IMPLANTS

An implant is a pharmaceutical dosage form or medical device that is placed inside the body to deliver a drug or therapeutic substance for a prolonged period (18,19). Implants are the sterile products intended to be introduced subcutaneously using a surgical procedure or subdermal injection of small rods or cylinders through the cannula (19,20). Polymeric implants are commonly prepared from hydrogels, silicon rubber or other biocompatible materials (20,22). Historically the subcutaneous implantation of drug pellets is known to be the first medical approach aiming to achieve prolonged and continuous administration of drugs (23). Over the years a number of approaches have been developed to achieve the controlled administration of biologically active agents via implantation or insertion in the tissue (18,23). Unlike conventional tablets or injections, implants can provide controlled, sustained or localized drug release (19-22).

Biodegradable implant

Biodegradable implant is an implant prepared from a polymer or other material that gradually breaks down into smaller products within the body and is eventually eliminated or metabolized (24-26). This alleviates the need for surgical removal of the implant after the conclusion of therapy increasing patient compliance(25,26).

Examples:

Polyaminoacids, polypeptides Carbopol poly(glycolide), Poly (D.L-lactide), poly(D.L-lactide-co-glycolide), poly (-caprolactone), poly(dioxanone), poly(hydroxybutyrate (26-30).

Non-biodegradable implant

Non-biodegradable implant is an implant prepared from a material that does not significantly break down or dissolve inside the body during the intended period of use (31-33). Therefore, the major disadvantage is they have to be completely released or when the treatment is completed, the implant generally has to be removed surgically or by another appropriate procedure (31,32,34).

Examples:

Polyethlene vinyl acetate, Polydimethyl siloxane Polyurethane, polyethylene and polyvinylchloride, ethyl cellulose. Ethylene-vinyl acetatePolytetrafluoroethylene (PTFE), Stainless steel and titanium (32-37).

CANCER

Drug-eluting medical implants are more common, particularly for fighting against cancers. Cancer constitutes a significant public health concern, exerting a considerable influence on millions of individuals worldwide. According to the 2020 World Health Organization (WHO) and International Agency for Research on Cancer (IARC), an estimated 20 million new cancer cases and 9.7 million deaths occurred in 2022, with the number of new cases projected to reach over 35 million by 2050, representing a 77% increase from 2022 (WHO, GLOBOCAN, 2024 (38). Despite recent progress in cancer therapies (39,40), the pursuit of more effective and safer treatment options remains imperative. Therefore, research on natural antioxidants (polyphenols, including ellagitannins such as oenothein B) (41,42) found in naturally grown medicinal plants is relevant globally as they hold the potential to provide alternative solutions to the ongoing challenges of using conventional therapeutic agents with severe side effects during cancer treatment (43,44).

Etiology

Cancer etiology involves genetic mutations and environmental factors like tobacco, radiation, and infections that cause uncontrolled cell growth. Treatment relies on options like surgery, chemotherapy, radiation, immunotherapy, and targeted therapies chosen by doctors based on the cancer type and stage. The heritability of cancers is usually affected by complex interactions between carcinogens and host'genome.

Treatment

Main Treatment Options

- **Surgery:** Physical removal of the tumor and surrounding tissue.
- **Chemotherapy:** Use of potent drugs to destroy fast-growing cancer cells.
- **Radiation therapy:** High-energy rays directed to shrink and kill cancer cells.
- **Immunotherapy:** Medications that help the body's natural defenses fight the cancer.
- **Targeted therapy:** Drugs designed to block specific genetic changes or proteins inside cancer cells.
- **Hormone therapy:** Treatments used to slow or stop cancers that feed on specific hormones.

Polymer profile

Name: Carbopol

Structure of Carbopol:

Carbopol® is a synthetic, high-molecular-weight, cross-linked polyacrylic acid polymer

widely used as a pharmaceutical excipient. The carboxyl groups provided by the acrylic acid backbone of the polymer are responsible for many of the product benefits Carbopol polymershave an average equivalent weight of 76 per carboxyl group. **(**45).

It is particularly useful in controlled-release formulations, gels, mucoadhesive systems, and drug-delivery applications. For a biodegradable implant study, however, the specific Carbopol grade and its suitability for implantation must be carefully justified**,** because conventional Carbopol is not generally regarded as a biodegradable implant polymer.

Physical and chemical properties of Carbopol

Physical Properties

- **Appearance:** Fluffy, white, dry powder.
- **Odor:** Slight, characteristic odor.
- **Particle Size:** Primary particles measure about 0.2 microns, aggregated into loose powders averaging 2 to 7 microns in diameter.
- **Hygroscopicity:** Highly hygroscopic; readily absorbs moisture from the air.
- **Solubility:** Insoluble in water and polar solvents, but disperses easily and swells up to 1,000 times its original volume to form a colloidal gel. (46,47,48).

Chemical Properties

- **Composition:** Contains 56.0% to 68.0% carboxylic acid (-COOH) groups calculated on a dry basis. (46,47,48)
- **pH Sensitivity:** Acidic in water dispersion (pH around 2.5–3.0). Thickening and gelation occur when neutralized to a pH of 5.5–6.6 using a base like triethanolamine or sodium hydroxide. (46,47,48).
- **pKa Value:** Approximately 6.0 (\(\pm \) 0.5). Neutralization causes ionization of carboxylate groups, creating electrostatic repulsion that unfolds the polymer chain to build viscosity .(46).
- **Incompatibilities:** Incompatible with strong acids, high concentrations of electrolytes, phenol, and cationic polymers. (46).

Physical and Chemical Properties of Carbopol polymers are shown in table no.1

Table No. 1 Physical and Chemical Properties of Carbopol

Appearance	**Fluffy, white, mildly acidic polymer**
Bulk Density	Approximately 208 kg/m3 (13 lbs. ft3) *
Specific gravity	1.41
Moisture content	2.0% maximum
Equilibrium moisture content	8-10% (at 50% relative humidity)
PKa	6.0 ± 0.5
pH of 1.0% water dispersion	2.5 - 3.0
pH of 0.5% water dispersion	2.7 - 3.5
Equivalent weight	76 ± 4
Ash content	0.009 ppm (average) **
Glass transition temperature	100-105C (212-221F)

RHEOLOGICAL PROPERTIES:

The different grades of Carbopol polymers have different rheological properties, a reflection of particle size, molecular weight between crosslinks and the fraction of the total units, which occur as a terminal, free chain ends. Viscosity range of different carbopol polymers are shown in table no.2 (50,51).

Table No. 2 Viscosity Range of Different Carbopol Polymers

No.	Polymer	Viscosity
1	Carbopol 934 NF	30500 – 39400
9	Carbopol 934 P NF	29400 – 39400
12	Carbopol 71 G NF	4000 – 11000

APPLICATIONS OF CARBOPOL POLYMERS:

The readily water swellable carbopol polymers are used in a diverse range of pharmaceutical applications to provide Controlled release in tablets, Bioadhesion in buccal, ophthalmic, intestinal, nasal, vaginal and rectal applications. Thickening at very low concentrations to produce a wide range of viscosities and flow properties in topical, lotions, creams and gels, oral suspensions and transdermal gel reservoirs. Several properties of Carbopol make it potentially valuable as a pharmaceutical excipient in numerous applications such as:

Controlled release and solid dosage forms:

Carbopol is being used in the controlled release solid dosage formulations since last four decades. The numbers of manufacturers commercializing controlled release tablets using Carbomers are increasing considerably in recent period of development. Tablet formulations using Carbopol polymers have demonstrated zero-order and near zero-order release kinetics. These polymers are effective at low concentrations (less than 10%). Still, they show extremely rapid and efficient swelling characteristics in both simulated gastric fluid (SGF) and simulated intestinal fluid (SIF). The Carbopol polymers produce tablets of excellent hardness and low friability. These polymers can be successfully formulated into a variety of different tablet forms, including the traditional swallowable tablets, chewable tablets, buccal tablets, sublingual tablets, effervescent tablets, and suppositories; providing controlled-release properties as well as good binding characteristics.

Carbomers show larger dissolution times at lower concentrations than other excipients. Because of these factors Carbopol polymers have greater extent in formulating dosage forms. Because Carbopol polymers swell rapidly in water and absorb great quantities, to avoid the use of flammable solvents, roller compaction is beingused as the method to prepare a new form of Carbopol polymer 71G NF. Carbopol polymer 71G NF is a useful and versatile controlled-release additive for tablet formulations in direct compression (51,52).

In this way carbomers act as efficient controlled release agents for matrix tablet and also improve bioavailability of certain drugs. They act as efficient binders in dry as well as wet granulation processes as only granular polymer (Carbopol 71G NF) available for direct compression formulation.

Oral Suspension Applications:

For many years, Carbopol polymers have been widely used in oral suspensions to thicken, modify flow properties, suspend insoluble ingredients and provide bio adhesion. The significance of these polymers is that they eliminate the settling problem even at low concentrations. As Carbopol polymers swell when hydrated and neutralized, they form colloidal dispersion. They are highly efficient at low level and provide long term stability of suspension over wide pH range. Also, they can be used to build viscosity and to mask the bitter taste of certain drugs (53,54).

Bio adhesive Applications:

Many hydrophilic polymers adhere to mucosal surfaces as they attract water from the mucus gel layer adherent to the epithelial surface. This is the simplest mechanism of adhesion and has been defined as "adhesion by hydration" Various kinds of adhesive force, e.g. hydrogen bonding between the adherent polymer and the substrate, i.e. mucus, are involved in mucoadhesion at the molecular level (55). Carbopol polymers have been demonstrated to create a tenacious bond with the mucus membrane resulting in strong bioadhesion. Many commercial oral and topical products available today and under investigation have been formulated with Carbopol polymers, as they provide numerous benefits in bioadhesive formulations. Along with excellent adhesion forces, they lower the concentration of active ingredient; provide patient compliance with increased bioavailability of certain drugs.

Topical applications:

As the carbomer are safe and effective, non-sensitizing and not having any effect on biological activity of drug, they are well suited to aqueous formulations of the topical dosage forms. They provide excellent thickening, suspending, and emulsification properties for topical formulations. Products with a wide range of viscosities and flow properties have been successfully formulated and commercialized. Carbopol polymers are used to permanently suspend the active ingredients in transdermal reservoirs as well as in topical gels and creams (56).

Oral Care Applications:

Carbopol polymers impart several desirable characteristics to toothpaste formulations like Viscosity, Yield Value, Low thixotropy and Clarity. Imparting viscosity at very low concentrations to thicken a system is a primary function of the polymers. Suspending abrasives and solid actives is accomplished through the build of yield value at low polymer concentrations. The combination of Carbopol

polymers' ability to build yield value with low thixotropy provides for a clean, non-stringing ribbon of toothpaste. From aesthetic and practical perspectives this means that Carbopol toothpaste formulations are pumpable, leave minimal solids residue on the tube rim, stand up well on the brush, and can be used in clear formulations (58,59).

Taste Masking Application of Carbopol:

Carbopol polymer is widely used in formulation and development of taste masked of bitter active pharmaceutical ingredients, because more than 50% of the pharmaceutical formulation having a bitter taste and for the patient convince and pediatric patients it requires to mask the bitter taste with suitable method. So, carbomer-934 and carbomer-970 was used for the taste masking purpose. Carbomer-934: drugs make a complex by kneading and by microencapsulation and after taste evaluation complexes formulated tablets and evaluate it (60).

Plant profile

Pouzolzia wightii is a plant in the nettle family, Urticaceae, often treated as a synonym for *Gonostegia wightii* or *Pouzolzia pentandra*. It grows as a small herb in moist areas and near streams across Peninsular India, including the Western Ghats. *Pouzolzia wightii* is widely distributed in the southern western ghats (Tamil Nadu and Kerala). In Tamil Nadu It is distributed in Papanasam Hills, Western /ghats, Theni and Tirunelveli districts (61,62,63). Rao *et al.* (64) reported the presence of phenols, flavonoids, saponins, steroids, glycosides and carbohydrates in different parts of *Pouzolzia wightii*. *Pouzolzia wightii* in order the fulfil the lacuna, the present investigation intends to fill this gap in research for better upgradation of Knowledge for certain types of bioefficacy and pharmacological studes in *Pouzolzia wightii.* With this knowledge, the present study was aimed to study phytochemical composition of *Pouzolzia wightii* and determine the biopotential of *Pouzolzia wightii.*

***Pouzolzia wightii* Benn**

Kingdom	: Plantae
Phylum	: Magnoliophyta
Class	: Magnoliopsida
Series	: Rosales
Family	: Utricaceae
Genus	: *Pouzolzia*
Species	: *wightii*

Distribution

P. wightii is a shrub which is widely distributed in the Southern Western Ghats. In India it is distributed in Tamilnadu and Kerala. In Tamil Nadu it is distributed in Papanasam Hills Tirunelveli District and Theni (61,62,63).

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MATERIALS AND METHODS

Plant Material: *Pouzolzia wightii Benn Leaf*

List of chemical substance used:

Carbopol powder, Acetic acid, Glutaraldehyde, Glycerin, Phospahate buffer saline.

List of equipment used:

Mortar, Spatula, Desiccator, Beaker Stirrer, Magnetic stirrer P^h meter, Electronic balance, Optical microscope

Collection of plant samples

Healthy and disease-free plants of *Pouzolzia wightii* Benn leaves were collected from Papanasam, Tirunelveli Hills, Tamil Nadu, South India. (Plate 3.1 and 3.2). The plant materials were identified based on the Flora of Presidency Madras and herbarium specimens were prepared at the collection site itself and the voucher specimens were deposited in St. Xavier's College Herbarium (XCH), Palayamkottai,Tamilnadu. India *P. wightii* – XCH 26880).

Preparation of Crude extracts

P. wightii were collected from their natural habitats and thoroughly washed by using tap water and then followed by distilled water to remove the unwanted debris. To remove the excess water, plant samples were blotted on the blotting paper and shade dried at room temperature for 20 days. The shade dried samples were grounded to fine powder using mechanical grinder. The powdered samples were stored in air tight container.

- Extraction**:** Take a suitable quantity of the powdered material (e.g., 100 g) and place it in a clean conical flask or Soxhlet apparatus. Add ethanol (70–95%) in an appropriate solvent-to-drug ratio.
- Concentration**:** Concentrate the filtrate under reduced pressure using a rotary evaporator at a temperature preferably below 40–45°C.
- Drying and storage**:** Further dry the concentrated extract to obtain a semi-solid or dry crude extract. Record the extractive yield (%) and store the extract in an airtight container at 2–8°C, protected from light.

Methods of preparation:

Preparation of Implants Using Extrusion Method

The solution of 5% acetic acid was formulated with the corresponding formula. Carbopol powder was slowly mixed into the solution and soaked for 15–20 minutes. Then the crude extract of *Pouzolzia wightii* was added into the

mixture. The mixture of feed residue and 5% acetic acid promote the uniformity of the feed material by slowly turning and mixing the powder.

The swollen mass formed in this process was uniformly mixed in a mortar and the remaining mass was collected with the help of a spatula, which became a viscous, starchy mass. During each extrusion run, sufficient polymer–drug mixtures were fed through the extruder.

The mass of the implant was then fed into the cylinder of the extruder and the cylinders were extruded from the nozzle of the cylinder. The feed rate of the uniform mass during extrusion was maintained at 0.2 g/min and the production rate of the implant rods was maintained accordingly. The pressure inside the extruder was maintained below 4000 psi to prevent overloading. At this pressure, the feed rate remained constant and uniform.

The rods were collected from the nozzle and allowed to dry in a desiccator overnight to avoid direct exposure to the open environment. The rods were then cut into 27 mm-sized implants. The sticks were kept to dry overnight at 40°C ± 1°C.

Cross-linking of implants: 25 mL of 25% glutaraldehyde was taken into a 100 mL beaker and placed in an empty desiccator. The implant rods were placed in the desiccator on a wire mesh and the desiccator was closed immediately.

Pre-treatment was performed with glutaraldehyde vapour at different time intervals (6 hours, 12 hours and 24 hours). The implants were then removed from the desiccator and allowed to dry for 72 hours. This process allowed complete reaction between the Carbopol and glutaraldehyde. After 72 hours, the implants were placed in an open environment for 7 days to evaporate residual glutaraldehyde. Again, the implants were kept at low temperature and rinsed with distilled water to facilitate cross-linking and remove residual glutaraldehyde remaining from the process.

EVALUATION OF IMPLANT

Uniformity of Weight:

The uniformity of the weight test was performed to maintain the uniformity of the weight of each implant. Implants were randomly weighed to calculate the average weight. No more than two individual weights exceed one percent from the average weight, and none is more than twice the percentage. The mean and standard deviation were determined and reported.

Bulk Density and Tapped Density (g/mL):

Bulk Density:

The mass of a powder sample that does not use a high density of a powder is proportional to its volume. Interparticulate zero volume contribution. Therefore, the bulk density depends on both the density of the dry particles and the spatial arrangement of the particles in the dry bed. The gross density is expressed in

grams per gram (g/mL), whereas the international unit is kilograms per kilogram (1 g/mL = 1000 kg/m³), because measurements are made using cylinders. It is also expressed in grams per cubic centimeter (g/cm³). The untapped sample of pure drug (W) was weighed and poured separately into a graduated measuring cylinder. The initial level (bulk) volume (V_β) was noted for every time to identify the density of powder particle and spatial arrangement of particle in powder bed.

Tapped Density:

Increased bulk density, which is obtained after mechanically pressing a dry container sample. Tapping density is obtained by pressing a mechanically measuring cylinder or vessel with a dry sample. After viewing the amount or weight of the initial powder, measurements of the cylinder or vessel volume or weight readings are taken until mechanical tapping and switching to more volume or weight. The mechanical tapping allows the cylinder or ship to lift up and fall under its own weight according to the distance specified in one of the three ways. When pressing a cylinder or ship, a rotating device may be preferred to reduce mass separation.

The measuring cylinder is placed on the tapped density tester USP and is subject to continuous tapping at 200 drop/minute until the difference between the initial and final volume is less than 2%. It was recorded as the final (tapped) volume (V_t) and the various flow characteristics are calculated with the following formulas.

Bulk density – ρB = W/VB Tapped density – ρT = W/VT

Compressibility Index:

Compressibility Index measuring the propensity of a powder. It therefore measures the disposal efficiency of the powder and allows it to evaluate the relative importance of interparticulate interactions. Relative to compressibility index and flexibility, for poorly flowing materials, interparticle interactions are frequent and large differences between bulk and tapped concentrations were observed. It was calculated by using the following formula Carr's Index or Compressibility Index (CI) = The CI value below 15% indicates good flow of the powder and above 30% indicates poor flow property of the powder. Compressibility Index = 1-pB/pT × 100

pB = Bulk density, pT = Tapped density. 3.4.4 Hausner's Ratio. Both the Hausner's ratio and the Carr's index are calculated from compressibility data. The test powder is gently loaded in a 100 ml cylinder through a funnel and weighed to calculate its bulk density. Next, the cylinder is tapped into a single platform tapped density meter, in this case 1500 times until the volume changes. The Hausner's ratio is calculated from the equation and from the Carr

index equation, where BD is the dry bulk density and the TD powder tapped density. It is calculated by the following formula; Hausner's Ratio = pT/pB. pB = Bulk density, pT = Tapped density.

The Hausner's ratio below 1.25 indicates good flow property and above 1.25 indicates poor flow property of the powder.

Drug content uniformity test:

Content uniformity of matter refers to a dose analysis technique that is used to ensure that each dose contains an equal amount of active drug fraction or amount, but that the test is qualitatively or quantitatively targeted. Appearance refers to the investigative process for measuring volume or functional activity of unit. For each individual implant were subjected to assess the drug content uniformity test. Measurements of the content were done by the HPLC. The mean and SD of drug content, formulation weight and concentration of active ingredient (w/w %) were calculated for each implant.

Implants were individually tested for weight and its active content. The concentration of the active substance is calculated by dividing the form content by the formulation weight. The content of the conversion from each batch is estimated. The implant was cut into small pieces of 50 ml volumetric flask, mixed with 45 ml of glacial acetic acid and stirred to dissolve the material. The volume was made up to 50 ml with glacial acetic acid. The solution was diluted with glacial acetic acid and tested for dacarbazine content by measuring the absorbance at 330 nm.

Diameter of Implants:

A minimum of three implants were measured for length and diameter with the help of Vernier calipers. Three samples were taken for the study from each batch, and mean value was calculated for the same.

Swelling index:

Implants were placed in a glass beaker containing 50 ml of phosphate buffered saline (PBS, pH 7.4) and the beakers were placed in a shaking incubator at 37 °C and 100 rpm. The implants were weighed periodically throughout the experiment. The weight of implant was measured after 1 hr, and the excess of solution was removed gently by tapping the surface with a dry piece of filter paper. The swelling studies were carried out in triplicate. The degree of swelling for each implant formulation at given time was evaluated using the following equation:

$$H = (Wt - W0) / W0 \times 100$$

Where, Wt and W0 are the weights of the sample at any given time and in the dry state, respectively.

RESULT AND DISCUSSION

The purpose of this study is to formulate and evaluate the biodegradable implants containing crude extract that could be used in the treatment of periodontitis by direct periodontal intra pocket administration. Biodegradable polymer carbopol was used to formulate the implants. Results revealed that the pharmaceutical formulation based on 25% Carbopol containing crude extract of *Pouzolzia wightii* may be releasing the drug and effective in the treatment of cancer patients especially in periodontitis.

According to Gad *et al*. (65), biopolymer containing secnidazole and doxycycline hydrochloride has promising activity in treating periodontitis in comparison with Atridox. In our present work also reported that may be efficient in the treatment of periodontitis.

Syed Ali Fathima, Johnson and Mohamed Ansar (66,67) suggest that the qualitative and quantitative analysis revealed the occurrence of a greater number of important phytochemicals in the ethanolic extracts might play a key role in the anticancer activity of *Pouzolzia wightii* leaves. In the present study may also use to heal the cancer.

CONCLUSION

The present study suggests that it may play a key role by giving prompt release of the drug in sustainable form while administration of direct periodontal intra pocket. Further research on the isolation of active principles from *Pouzolzia wigthtii* may leads to find an alternative medicine with anticancer property.

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