International Journal of Pharmaceutical Research and Applications
Volume 6, Issue 3 May - June 2021, pp: 1127-1135 www.ijprajournal.com ISSN: 2249-778

A review on Medicinal plants of Buchanania Cochinensis In treatment of Asthma disease

Sunita Nirala
Danteswari College of Pharmacy Jagdalpur Chhatisgarh, India

Date Of Submission: 01-06-2021 Date Of Acceptance: 17-06-2021

ABSTRACT
Buchanania Cochinensis is a Herbal drug medicinal plant many years old, it is commonly known as chironji.In India it is found in India mostly in eroded lands which belonging to family Anacardiaceous
(cashew family).Asthma is a chronic inflammatory disease of the airways that may lead to limitations in regular activities, to hospitalization and a decrease in quality of life. Adherence to drug treatment is crucial for control the disease. The use of home remedies and herbal medicines in treating various diseases in common and culturally widespread.Todays time the common symptoms of asthma are wheezing, breathlessness, chest tightness and coughing, particularly at night and awaking in the morning. It is highly widespread global disease from air pollution through dusting particles which is present in air.
All parts of these plants many effective disorders treated like diarrohoea,constipation,asthma,wound healing cough and various pharmacological effects are antioxidant,anti-inflammatory,The phytochemical screening extracts of this plant are present in various chemical constituents like Kernels lipids, neutral lipids,triacyglycerol and free fatty acids,these chemical extracts are good therapeutic effects show to treat asthma disease. In this paper the present research work is mainly perform for the phytochemical activity of plant extracts and treatment of asthma disease to cure by herbal formulations and pharmacological activities of Buchanania Cochinensis (Anacardaceae family).
Keywords- Herbal medicine, pharmacological activities, treatment of asthma, herbal formulation

I. INTRODUCTION

The Herbal drug plant Buchanania Cochinensis are the ancient times used in the treatment of various diseases in the early period. The people of earlier times to eat tree leaves when they were hungry. Plants or their parts like tubers, fruits, leaves, etc.As no harmful effects were observed he considered them as edible materials and used them as food. If he observed other effects by their eating they were considered in edible, and according to the actions he used them in treating symptoms or diseases. Buchanania Cochinensis are the common name Amondotte, charoli, Nut in the Anacardaceaefamily. Buchanania Cochinensis plant is in evergreen tree that grows around 18m tall and is found in East Asia,India,Chhatisgarh and Orissa. It is used in Ayurveda and Unani medicine formulation. Thefruits obtained from the tree are used as treatment of asthma and coughs. Theroots, on the other hand, are used against diarrhoea,the leaves against skin ailments. It is a highly nutritious plant. It possess 3.0% moisture and are rich in lipid/fat(59.0%),protein (19.0-21.6%),starch carbohydrate (12.1%),fiber (3.8%) etc.There seeds are used as expectorant and tonic. The oil extracted from kernels is applied on skin diseases and also used to remove spots and blemishes from theface. TheChironji tree that extracts when extracted helps it for food digestive, for fulfillment of purgation property,couging and aphrodisiac.. The gum after mixing with goat milk is used as analgesic. Theleaves contain tannins, triterpenoids, saponins, flavonoids, kaemppferl-7-o'glucosides, quercetin, gallic acid, kaemferol and reducing sugars and including a new glycoside.

Botanical Description

The synonyms and the common names are chironji, Buchanania lanzan, Buchanania latifolia,chironjia sapida.The cultivation of Buchanania Cochinensis is an evergreen tree growing to 12m (39ft) by 10 m (32ft) at a medium rate. A plant of mainly drier areas in the tropics and subtropics, where it is found at elevation up to 1,200 metres.It grows best in areas where around annual day temperatures are within the range 32-42°,but can tolerate 5-48°c.It prefers a mean annual rainfall in the range 1,000-1,500mm but tolerates 750-2,200m.Grows well in for sun but can also tolerate considerable shade, especially when small. For cultivation include dry solis,Prefers a PH in the range 5.5-6,tolerating 4,5-7.2.It is common in our

International Journal of Pharmaceutical Research and Applications
Volume 6, Issue 3 May - June 2021, pp: 1127-1135 www.ijprajournal.com ISSN: 2249-778

forests mostly eroded lands. It avoids waterlogged areas, but occurs locally in clay soils also. It can be identified by the dark grey crocodile bark with blaze. The char Chironji leathery leaves are very widely shape ,the leaves part have bluntly tip and the base of the leaf is circular . Leaves have 10-12 pairs of straight, parallelveins. The plants have look like greenish pyramidal and the flowers come in this plant arly spring. .The fruits of Chironji ripen from April to may month and the Chironji plant life span long time. Flowering January-March.

Plant Names in Different Languages:
Hindi - Char chironji, chiranji, piyal, pre-savak, priyal
Marathi- Char, charoli, piyal
Tamil - Charam
Malayalam - mungaappeezh, nuramaram
Telugu - Char, charumaidi, priyaluvu, raj-adanamu
Kannada –Charoli, kole maavu
Bengali – Chironji, piyal, sarop
Oriya – Charu, chanhara
Urdu- Chironji
Gujarati-Charoli
Sanskrit- Akhatth, muni, piyala, prasavakh

BOTANICAL PROFILE OF BUCHANANIA LANZAN
Family – Anacardiaceae
Kingdom – Plantae
Order- Sapindales
Genus –Buchanania
Species – Buchanania lanzan
Synonyms – Buchanania Cochinensis Lour, Buchanania latifolia, chironia sapida

Asthma is a chronic inflammatory syndrome characterized by airway hyper-responsiveness and variable airway airflow limitation, characterized by recurrent episodes of wheezing, breathlessness, chest tightness,coughing,particularly at night and awaking in the morning. It is a highly prevalent global disease affecting approximately 300 million individuals worldwide (WHO 2007).Among adults, Brazil has one of the highest prevalence in 70 countries studied, afflicting 12.5% of women and 11.5% of men (WHO, 2009).The prevalence of asthma symptoms in Brazil is also high among children (23%) and adolescents (19%).Today is strong evidence that the prevalence of asthmas has increasing in a number of countries in recent centaury.

Drug treatment of severe asthma in modern countries is based on the administration of anti-inflammatory medications

II. MATERIALS AND METHODS

1. Selection of Drug: Due to ease in availability and on the basis of literature survey, Buchanania cochinensis fruits were selected for the present study.

2. Preparation of plant Extracts

The fruits of Buchanania Cochinensis were cleaned and the dust particles were removed. It was the dried and made into a coarse powder with the help of electronic grinder. The powder was passed through sieve no.40; about 100 gm of grinded plant material was subjected to soxhlet extraction 40-60ºC employing methanol (95%) as solvent. After completion of extraction it was filtered and the solvent was filtered and the solvent was removed by evaporation to dryness on a water bath.

Within 2-3 days yellowish green colour residue was obtained and it was stored in a dessicator.colour extract was found and % yield was calculated.

% yield = mass of extract/ mass of fruits powder x 100

Testing of the extracts for aalkaloids, carbohydrates and glycosides, sterols, proteins, lipids and following results were obtained. For prevention of symptoms and relief by medications like bronchodilators beta2 agonists during exacerbations, studies have shown the preventive treatment of asthma to cost effective, especially in more severe and uncontrolled disease.Todays modern times in India many herbal formulations to treatment for asthma in the Ayurvedic properties of the plants extracts Rasa, Tikta, Kashaya, Guna, Lakhu, virya, Ushna.In herbal formulation we study for the treatment of asthma.

TREATMENT OF ASTHMA DISEASE
Treatment of Asthma:

In olden times. When someone fell ill, they used to treat according to the symptoms of the patient. Asthma is considered as a brochospasm problem and treatment mainly includes bronchospasm.However, in the early 1980s when asthma emerged as an inflammatory rather than predominantly bronchospastic disorder, the basic approach changed from the control of symptoms to the control of underlying airway inflammation. According to guidelines of the National Asthma

International Journal of Pharmaceutical Research and Applications
Volume 6, Issue 3 May - June 2021, pp: 1127-1135 www.ijprajournal.com ISSN: 2249-778

Education and Prevention Program'sNAEPP) guidelines for the diagnosis and management of asthma, the treatment should have following goals:
1. Maintain normal activity levels, including exercise.
2. maintain normal or near normal pulmonary function.
3. Prevent chronic and troublesome symptoms.
4. Prevent recurrent exacerbations.
5. Avoid adverse effects from medications.
The pharmacological activities management of asthma depends upon frequency and severity of patient's symptoms. The asthma disease in human body against day by day increase the preventive measures to be control needs to be used. The following categories of drugs are used in asthma:
1. Bronchodilators
2. Anti-inflammatory agents

1. Bronchodilators

The drugs have an anti-bronchoconstrictor effect that is used herbal remedies like oil of Chironji seeds in vitro drug induced relaxation in airway passages in respiratory system This action to be believed in direct effect on smooth muscle of respiratory passages.. However, pharmacologic effects on the other airway cells may contribute to the overall reduction in airway narrowing.

(a) β-adrenergic agonists

Epinephrine and Chironji oil combined has been used to treat asthma since the beginning of the 20th century. Adrenergic agonists aremost widely used and effective bronchodilators for the treatment of asthma. Bronchodilator is mediated by β2receptors; β2 selective drugs (Salmeterol and Formoterol)
have been developed that have long duration of effect. B-Adrenergic agonists lead to relaxation of bronchial smoothmuscle that promote bronchodilator. Activation of adenylate cyclase increases the concentration of intracellularcyclic adenosine 3′, 5′-monophosphaste (cAMP), and leading toactivation of specific cAMP-dependent protein kinases thatcause relaxation

Relaxation may also be due to inhibition of myosin phosphorylation.. B-adrenergic agonists prevent release of mediators from anumber of inflammatory cells in vitro. The inhaled route of administration is preferable to theoral route because adverse effects caused by systemicaction of the drug are less and also because this route maybe more effective. The inhaled drug reaches surface cells(e.g., mast cells or epithelial cells), which are lessaccessible to the orally administered drug's agonists improve respiratory symptoms and exercisetolerance despite thesmall improvement in spirometricmeasurements. . Ephedra sinica has been shown to reduce adherence of bacteriasuch as H. influenza to airway epithelial cells.

Table:1 Examples of Bronchodilator Drug

S.No	Name of plant	Part used/extract/fraction	Major chemical constituent
1.	Adhatoda vasica Nees	Leaves, roots	Alkaloids
2.	Ephedra sinica	Stems	Ephedrine
3.	Ocimum sanctum	Leaves/Ethanol	Myrcenol,Nerol,Eugenol

(b) Anticholinergic
Datura plants contain the muscarine antagonist and weresmoked for relief of asthma centuries ago. Now a days, atropine from Datura plant are the most commonly available anticholinergics.Antimuscarinic agents specifically antagonize muscarinereceptors. The reflex cholinergic bronchoconsriction and these agents do not block the direct effects of inflammatory mediators, example histamine and leukotrienes on bronchial smooth muscle. and vessels . When given byinhalation, anticholinergic produce bronchodilator by competitively inhibiting cholinergic receptors in bronchialAnti-inflammatory drugs

2. Anti-inflammatory Activities

Anti-inflammatory drugs Buchanania cochinensis suppress the inflammatory response by inhibiting infiltration and activation of inflammatory cells as well as their synthesis of effects of inflammatory mediatorsthemselves.

(a) Corticosteroids
Since asthma is viewed as a chronic inflammatory diseaseand inhaled corticosteroids are known to have low toxicity,they may be considered as first line therapy.Buchananania cochinensis were effective when theywere given systematically to treat asthma but they had noanti-asthmatic activity when they were given by inhalation. Other corticosteroids e.g. Buchananania cochinensis fruits extracts, were effective intreating asthma when given by inhalation. Corticosteroids inhibit

International Journal of Pharmaceutical Research and Applications
Volume 6, Issue 3 May - June 2021, pp: 1127-1135 www.ijprajournal.com ISSN: 2249-778

the release of arachidonic acid metabolites and platelet activating factor (PAF) from lungsand macrophages by enhancing the production of proteins called lipocortin. Thereby they inhibit the formation of prostaglandins and leukotrienes. These effects occur because of ability of steroid—receptor complex to be transported to the nucleus, where it initiates DNA transcription. Of specific mRNAs. Corticosteroids potentially inhibit the accumulation of neutrophils; inhibit secretion of humanpulmonary macrophages of leukotrienes and prostaglandins to be at risk of symptomsand exacerbations. New inhalation devices and newgeneration beta-agonists are available. At the same time, new understanding of the herbal drug technology of asthma hasidentified several novel therapeutic targets. Agents beingtested in early phase clinical trials include antagonists of IgE,cytokines, adhesion molecules and transcription factors.TXA2 inhibitorsTXA2 is a potent bronchoconstrictor, mucus producer and blood vessel permeability inducer and causes airway hyper responsiveness.

Table 2 Anti-inflammatory agents

S.No	Name of Plant	Part used/extract/fraction	Major chemical constituents
1.	Buchanania cochinensis	Fruits/methanol	Kernels lipids, neutral lipids,triacyglycerol and free fatty acids
2	Tylophora asthmatica	Leaves/Alkaloidal	Tylophorine
3.	Curcuma longa	Rhizomes	Tumerones,curcuminoids
4.	Pavetta crassipes	Leaves/Aqueous	Flavonoids, tannins
5.	Calotropis procera	Latex	Triterpenoid

HERBAL FORMULATION

EXPERIMENTAL WORK

2.1. Preparation of Buchananania cochinensis extract

Buchanania cochinensis leaves were collected and leaves were chopped and subjected to extraction using water as solvent as 60◦C. Decoction was prepared by evaporating the extract to one third of its volume. Decoction was poured onto a glass tray and dried at 100◦C. Dried extract was pulverized and stored in a desiccators.

2.2 Selection of exciepients :Starch was chosen as disintegrate, calcium phosphate dibasic and Pearlitol as bulking agent, magnesium stearate as antiadherant, coloring agent to impart colour and methyl and Propylparaben as preservatives. To mask the extreme bitter taste of , sucralose was used as sweetener, citric acid as taste masker and sialagogue and for flavoring strawberry flavor was used. The coloring and flavoring agents used were of food grade quality.

2.3 Preparation of Granules

Formulation

Granules were prepared by using wet granulation technique. Buchanania cochinensis extract (powder) and citric acid were mixed in a mortar to which sucralose and strawberry flavor were added. This was followed by subsequent addition of starch, Pearlitol, calcium phosphate dibasic and the paraben. Sufficient quantity of distilled water was added to form a lumpy mass which was then passed through sieve no. 22 to form granules. Granules were dried in the oven. Magnesium stearate was added at the end

Table 3: Formulation

S.No.	Ingredients	Quantity(mg)	Category
1.	Buchanania cochinensis	125	Antiasthamatic
2.	Starch	150	Disintegrate
3.	Magnesium stearate	2.5	Antiadherant
4.	Pearlitol	312.5	Bulking agent
5.	Calcium phosphate dibasic	250	Bulking agent
6.	Citric acid	125	Taste masker, sialagogue
7.	Methyl paraben	2	Preservative

International Journal of Pharmaceutical Research and Applications
Volume 6, Issue 3 May - June 2021, pp: 1127-1135 www.ijprajournal.com ISSN: 2249-778

8.	Propyl paraben	0.5	Preservative
9.	Cinnamon	qs	Flavouring agent
10.	Honey	qs	Sweetening agent
11.	Turmeric	qs	Colouring agent

Buchanania cochinensis extract (powder) was taste masked with honey and added to a beaker containing molten chocolate. The mixture was stirred and allowed to partly cool down so as to form a lumpy mass which was then passed through sieve no.22 to form granules. Granules were kept in refrigerator for 15 minutes

2.4 Evaluation of granules: Angle of Repose

1. Weigh 100g of given sample orange peel powder.
2. Take clean and dried funnel and arranged on the iron stand, such that the tip of funnel was approximately 3.5 to 4cm from the bottom.
3. Closed the orifice of funnel by thumb and pore the vary powder sample into the funnel.
4. Remove the thumb and the sample was allowed to flow on a plane surface having white paper.
5. The height of the heap and diameter was noted down and angle of repose was determined.
6. Using formula,
7. The sample procedure was repeated raised for each powdered sample.
8. Relationship between angle of repose and powder flow:

Angle of Repose	Flow
Less than 25	Excellent less than 40
25-30	Good
30-40	Passable

III. RESULT AND DISCUSSION

The extraction was achieved using methanol as solvent and % yield was found to be 7.9% w/w.

Percentage yield = Actual yield/Theoretical yield x 100

= 15/19 x 100

= 79%

On preliminary phytochemical screening following constituents were identified. The results showed that alkaloids, tannins, flavonoids, cardiac glycosides, proteins, carbohydrate, reducing sugar, steroids are present methanolic extract of the plant.The results shown

Table no.4

Phytochemical screening of Buchanania cochinensis plant extracts part fruits

S.No.	Test	Methanol	Observation	Result
1.	Alkaloids	-ve	No change	Absent
2.	Glycosides &carbohydrates	+ve	changes	Present
a.	Molish test	+ve	Violet ring	Present
b.	Fehling's test	+ve	Brick red ppt.	Present
3.	Sterols	-ve	No change	Absent
4.	Flavonoids-Shinoda test	+ve	changes	Present
5.	Proteins	-ve	No change	Absent
6.	Lipids	+ve	changes	Present
7.	Fatty acids	+ve	changes	Present

International Journal of Pharmaceutical Research and Applications
Volume 6, Issue 3 May - June 2021, pp: 1127-1135 www.ijprajournal.com ISSN: 2249-778

S.No.	No. of Tapping	Tpping volume	Tapping Density	Bulk volume	Bulk Density	% of carr's
1.	100	72	90.009	90	0.3333	89%

The pharmacological activities studied in anti-flammatory and bronchodilator drug the treatment for asthma disease as B-Adrenergic agonists lead to relaxation of bronchial smoothmuscle that promote bronchodilator. Activation of adenylate cyclase increases the concentration of intracellularcyclic adenosine 3′, 5′-monophosphaste (cAMP), and leading toactivation of specific cAMP-dependent protein kinases thatcause relaxation may also be due to inhibition of myosin phosphorylation.. B-adrenergic agonists prevent release of mediators from anumber of inflammatory cells in vitro.Buchananania cochinensis fruits extracts, were effective intreating asthma when given by inhalation. Corticosteroids inhibit the release of arachidonic acid metabolites and platelet activating factor (PAF) from lungsand macrophages by enhancing the production of proteins called lipocortin. Thereby they inhibit the formation of prostaglandins and leukotrienes. These effects occur because of ability of steroid—receptor complex to be transported to the nucleus, where it initiates DNA transcription. Of specific mRNAs. Corticosteroids potentially inhibit the accumulation of neutrophils; inhibit secretion of humanpulmonary macrophages of leukotrienes and prostaglandins to be at risk of symptomsand exacerbations. New inhalation devices and newgeneration beta-agonists are available1. The angle of repose of given sample of Chironji fruit powder was flow property29.33.

S.No.	Height(cm)	Diameter(cm)	Radius(cm)	Tan=h\r	Angle of Repose
1.	2.5cm	6cm	3.0cm	0.8332	39
2.	2.8cm	6cm	3.0cm	0.0933	5
3.	3.0cm	6.2cm	3.1cm	0.9677	44

2. Bulk Density

1. 20gm of powdered was weighed and passed through sieve no.20.
2. A 100ml of measuring cylinder was thoroughly cylinder and the initial weight of powder, initial noted in the measuring cylinder.
3. Then, bulk density was calculated using formula and bulk density.

Bulk Density=weight of the powderBulkvolumeCalculation:-wt. Of powder/bulk volume=20/46=2.3gm

4. Result :-The bulk density of given sample Chironji fruit powder was to be :-

Table no.5

S.No.	Powder sample	Weight(gm)	Bulk volume(initial wt.)	Bulk Density

International Journal of Pharmaceutical Research and Applications
Volume 6, Issue 3 May - June 2021, pp: 1127-1135 www.ijprajournal.com ISSN: 2249-778

S.No.	No. of Tapping	Ta pping volume	Tapping Density	Bulk volume	Bulk Density	% of carr's
1.	100	72	90.009	90	0.3333	89%

1.	Chironji fruit powder(20gm)	20gm	46	2.3

TAPPED DENSITY:-

1. 20gm of powdered was weighed and passed through sieve no.20.
2. A 100ml of measuring cylinder was thoroughly cylinder and the initial weight of powder, initial noted in the measuring cylinder.
3. Then, bulk density was calculated using formula and bulk density.
4. For determining tapped density 50 times tapping was done was done to the measuring cylinder to the weight amount of powder.
5. The tapped density was calculated using the formula of tapped
6. density

Formula, Tapped density= wt. Of powder/Tapped volume.
= 20/40
= 2gm.

Result:-The tapped density of given sample Chironji fruit powder was 2gm.

Table No.6

S.No.	Powder sample	Weight	Tapped volume	Tapped density
1.	Chironji fruit powder	20gm	40gm	2gm

Carr's Consolidation Index

1. A 100ml of measuring cylinder was thoroughly cleaned and dried.
2. The given powder was weighed 30gm and passed through standard sieve no.20.
3. Then, this weight amount of powder was introduced into the measuring cylinder.
4. The cylinder was then tapped for various tapping's for 12-100.
5. The volume occupied was noted in each set of tappings and the tapped volume was measured.

i. Average Carr's consolidation Index=Tapped density - Fluff density/Tapped density×100

=

90.009-0.3333/90.009×100

=

89.68.

Result:-Thus, thecarr's consolidation Index of given sample of Chironji fruit powder was

=89.68

Porosity:-

1. 20gm of powder is taken, its bulk volume has been found.
2. True volume is also found in the previous experiment.
3. And with the help of formula porosity of given sample is found.
4. Calculation, forporosity=Bulk volume-True volume/Bulk volume

a. = 46-14.8/46
b. = 45.67

5. Result:-The porosity of given sample Chironji fruit powder

= 45.67gm

True Density:-

1. Density bottle was taken cleaned, dried and weight accurately.
2. Added small quantity of powdered sample in the density bottle and accurately weighed.
3. The density bottle was filled with solvent in which the powdered sample was insoluble without removing the powdered material.
4. The weight of the density bottle having powder and solvent was taken.

International Journal of Pharmaceutical Research and Applications
Volume 6, Issue 3 May - June 2021, pp: 1127-1135 www.ijprajournal.com ISSN: 2249-778

5. Then, the true density was calculated by the formula,
6. Formula, True density=wt. of powder/True volume of powder.

The same procedure was repeated thrice.

CALCULATION,
Wt. of empty bottle (w1) =14.8
Empty bottle +sample (w2) =16.75
w3=16.75-14.8
= 1.95gm.
w4=empty bottle water
=42.32
w5 = w4-w1
=42.32-14.8
= 27.52gm
w6= empty bottle+sample+water
= 14.8+1.95+27.52
44.27gm.
Formula:-
, True density=weight of sample/True volume, = 44.27gm

Formula,
Truedensity = weight of sample/True volume
True density = 1.95/14.8
= 0.13gm
Result:-The true density of Chironji fruit powder of given sample was 0.13gm.

Particlesize distribution of powder by sieving method

1. Arrange the set of sieves in the descending order.
2. Accurately weigh the powder 100gm and keep it at the top of sieve set.
3. Shake the sieve set continuously for 3 minutes.
4. Collect the material retained on different sieves.
5. Accurately weigh the material retained on the sieve.

Result:-The Particle size sieving method of given sample Chironji fruit powder was to be given on the

Table no.7

S.No.	Sample of Chironji fruit powder	Sieve no.22#	Sieve no30#	Sieve no.44#	Sieve no.100#	Sieve no.120#
1.	100gm	80.32	75.25	30	20	10

REFERENCE

[1]. ShalinikapoorMehta,SwarupanandaMukherjee,B.Jaiprakash,PreliminaryPhytochemicalInvestigationorleavesofBuchananiaLanzan(Chironji)vol.3issue2,2010;010
[2]. Manimaransellappanetal/Int.j.ofRes.inpharmacologyandpharmacotherapeuticsvol-3(2)2014(90-96)
[3]. Tacilapiresmega,Pablodemourasantos,AdelmirSouzamachado,LuciaAraujoBeislcosta"Noblest.AlvaroAugustocruz,UseofMedicinalherbsbypatientswithsevereasthmamanagedataReferralcenter,BJPSvol.47(3),2011
[4]. RasikaN.Patil,sahadeop.Rothe,Buchananialanzan;anenormousMedicinalvalueIJARIIE-ISSN(0)-2395-4396,vol3(1)-2017.
[5]. PhysicalpharmacypracticaltextbookR.prasadmohantaprabolkumar,mahnoPharmabooksyndicate,pageno.227
[6]. SubrahmanyamCVS"Textbookofphysicalpharmacypharmaceutics"vallabhprakashan,Delhi1st edition,pageno-218-219.
[7]. KalaCP(2009),AboriginalusesandmanagementofethnobotanicalspeciesindeciduousforestsofChhattisgarhstateinIndiaJ.EthnobotanicalEthnomed4(5):20
[8]. NarayanBabulalGaikwad,Girirajkulkarni,K.Gowthmarajan,E.P.Kumar,DevelopmentofcontrolledreleasespheroidsusingBuchananiacochinensisgum,J.ExcepientsandFoodchem.4(1)2013-14
[9]. Naziakhatoon,Rajinderk.Gupta,YogeshK.Tyagi,Nutraceuticalpotentialandphytochemicalscreeningofbuchananialanzan,anunderutilize

dexoticIndiannutanditsuseasasourceofafuncti onalFood2015,4(1);87-94
[10]. ShailasreeS,Rama,andK.PrakashHS,Curative propertiesofBuchananialanzan:Asevaluatedb yitsanti-oxidant,anti-inflammatoryandDNAprotectivepropertiesJ NatPharma2012;3,71-7.
[11]. KirankumarHullatti,ManjunathaJR,Kuppash IJ,ComparativestudyonDiureticeffectofBuch ananiaangustifoliaRoxb,andBuchananiaLanz anspreng'FruitextractsandFractions,J.Appph armsci,2014;4(08):059-063.