

Elementary Analysis of Bhasmas used as Ethnomedicine in Tribal Areas of Mayurbhanj Districts of Odisha, India



Sitaram Swain, Tapasi Upadhyaya

Abstract: Ayurveda is known as the oldest practice system in traditional medicine. This medicine system science is closely associated with social, psychological and spiritual with the living society. From ancient period, many works have been done and documented in Ayurveda and Charaka Samhita. World Health Organisation reported that more than six billion people depend primarily on ethno medicine. Now it is considered as an important alternative therapy among known other practices. Animals and their by-products form important ingredients have been considered for the preparation of medicine. Since seventh century, Ayurvedic bhasmas are known in India for curing of many chronic ailments. Bhasmas are commonly known as 'biological nanoparticles' and it is derived from animal's derivatives through incineration. These bhasmas have been orally administered by mixing with honey to reduce the adverse effect of these drugs. In this study there six bhasmas and honey samples were taken for X-Ray fluorescence (XRF) spectroscopy analysis. Presence of these elements has showed their significance in therapeutically potent even in low doses. Now it has given novel health care look in Ayurved for tribal areas as well as modern society.

Keywords: Ethnomedicine, Bhasma, XRF

I. INTRODUCTION

Ayurveda is practiced over thousands of years as the oldest traditional medicine system. Ayurveda deals with knowledge of life as *Veda* (knowledge) and *Ayush* (life). This vedic science is closely associated with the psychological, spiritual as well as the physical functions of our body. From ancient period, many works have been done and documented in *Ayurveda* and *Charaka Samhita* [1]. World Health Organisation reported that more than six billion people depend primarily on ethno medicine. Now it is considered as an important alternative therapy among known other practices. Animals and their by-products form important ingredients have been considered for the preparation of medicine. In the United States of America, out of 150 prescribed drugs 27 drugs have animal origin which are currently in use and in India, animal based Ayurvedic medicine is about 15% to 20% [2-4].

In Ayurved, vedic-chemistry (Rasa-Shastra) deals with preparations of Bhasmas. Since seventh century, Ayurvedic bhasmas are known in India for curing of many chronic diseases. Bhasma commonly known as 'ash' and it is derived from animal's derivatives through incineration [5]. Bhasmas are considered as biological nanoparticles and neutralizing the acidic by its alkalinity to maintain normal health. Some of these Ayurvedic drugs are prepared by using marine animals such as pearl, pearl oyster and conch. These are inorganic preparations produced by an alchemic process, which converts mineral into its compounds like carbonates, oxides, etc. These bhasmas have been orally administered by mixing with honey, cinnamon and ghee to reduce the adverse effect of these drugs. These are therapeutically very potent and quick acting even in low doses. Now it has given novel health care look in Ayurved [6,7]. Natural honey is produced by *Apis mellifera* as a natural sweet substance and it has unique nutritional and medicinal properties. Generally natural honey is sticky and viscous in nature. It has about 85% of carbohydrate, 15% of water and 0.4% of proteins. It also contains some amino acids, vitamins, and enzymes with some antioxidants [8]. Diverse geographic regions with vegetations may be the major factors for varieties of honey [9]. Generally honey constitutes some elements like Mn, Na, K, Li, Rb, Cu, Mg, Zn and Fe [10,11]. Metals in medicines sometimes associated with toxicity. Bhasma and honey exhibit non-toxic with antioxidant activity in human as medicine [12,13]. These are associated with superoxide dismutase and catalase to reduce free radicals. The basic aim of this article is to determine the composition of different elements in bhasma and their therapeutic uses. It also gives the preliminary ethnozoological practices in tribal areas of Mayurbhanj district.

II. MATERIALS AND METHODS

This investigation was covered two aspects of ethno-zoology. Here one aspect included the field survey of local tribal area to enlist the animal products used as medicines and another was experimental analysis of Ayurvedic medicines used by Ayurvedic doctors. The entire investigation was carried out from the month of September, 2018 to December, 2019. The preliminary the ethno-zoological study was conducted in tribal areas of Mayurbhanj district, Odisha, India. Geographical coverage of this district is about 10,418 Sq.Km. and it is situated in North latitude 21° 16' and 22° 34' with East longitudes of 85° 40' and 87° 11' [14]. The study sites were selected based on the tribal population and used of animal products from the villages of Sarukana, Dukura, Balidih, Balimundali, Kantisahi, Dulisol Juradihi, Damodarpur and Chhuruni.

Revised Manuscript Received on March 30, 2020.

* Correspondence Author

Sitaram Swain*, Department of Zoology, Centurion University of Technology and Management, Odisha, India. Email: sitaram.swain@cutm.ac.in

Tapasi Upadhyaya, Department of Zoology, Centurion University of Technology and Management, Odisha, India. Email: tapasiupadhyaya@gmail.com

© The Authors. Published by Blue Eyes Intelligence Engineering and Sciences Publication (BEIESP). This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>)

A. Collection of data

As this district is dominated with the tribes, data were collected for preliminary study during the field survey by using questionnaires. It was an open ended interaction about the preparation of traditional medicine by using the animals and their products [15]. The experienced peoples were very much frequent about the preparation of medicines by using animal by-products. The preparation and use of medicine have been continuing from their ancestors as significant source of primary healthcare system. Data were collected by interacting with local language and the enlisted data were scientifically verified for the investigation.

During the study, some Ayurvedic bhasmas were also used by doctors for treatment of local people. These bhasmas were generally prepared from animals or from their by-products. These bhasmas were enlisted by the help of physicians and these were purchased from market. Honey also used mix with bhasma or separately to cure chronic diseases. Honey and enlisted bhasmas were analysed through XRF spectroscopy in the laboratory of Centurion University of Technology and Management, Odisha, India. XRF analyses almost all chemical elements of periodic table present in the sample from atomic number 11(Sodium) to 92(Uranium) and detected the major, minor as well as trace elements present in the drugs [16].

B. Preparation of samples

Honey was purchased from the local market by a plastic bottle and transferred to laboratory. The most prescribed bhasma were considered for the analyses like Sankha bhasma, Mukta bhasma, Pravala bhasma, Muktasukti bhasma, Cowry bhasma and Kukkutandavak bhasma. For XRF analysis, samples were kept on a measuring cup, which was supported film and measured the reading in XRF spectrophotometer. This spectrometer has designed to measure samples in a cup with circular disks having radius between 5 to 50 mm. In spectrophotometer, two grams of powder samples were placed on transparent films. After analysing, the readings were recorded in the system.

III. RESULTS AND DISCUSSIONS

This preliminary ethno-zoological study was undertaken in the tribal region of Mayaurbhanj District. This study was including local tribal people and Ayurvedic physician. According to them, they have been continuing the uses of traditional medicines from their ancient generations. There are some ethno-zoological practices which have been continuing from their ancestors to till now [17]. These traditional medicines are represented in Table-1.

SL No	Scientific name	Common name	Classes	Aliments
1	<i>Rana spp.</i>	Frog	Amphibia	Applied over wound for easy healing
2	<i>Viper Russels</i>	Viper	Reptilia	Prevents back pain.
3	<i>Naja naja</i>	Cobra	Reptilia	Cancer, leprosy
4	<i>Varanus bengalensis</i>	Monitor	Reptilia	Back pain.
5	<i>Columba livia</i>	Pigeon	Aves	Renal calculi, paralysis
6	<i>Gallus gallus</i>	Hen	Aves	Relives Chest pain
7	<i>Viper Russels</i>	Viper	Reptilia	Prevents back pain.
8	<i>Naja naja</i>	Cobra	Reptilia	Cancer,leprosy, rapid healing
9	<i>Testudo spp.</i>	Tortoise	Reptilia	Piles
10	<i>Varanus bengalensis</i>	Monitor lizard	Reptilia	Prevents back pain
11	<i>Funambulus palmarum</i>	Squirrel	Mammalia	Whooping cough
12	<i>Lepus nigricollis</i>	Hare	Mammalia	Constipation Asthma Worms (ascaris)
13	<i>Capra hircus</i>	Goat	Mammalia	Asthma, cough Joins the fractured bones Fewer in children
14	<i>F.domesticus</i>	Cat	Mammalia	For ear discharge Tonsillitis
15	<i>Canis familiaris</i>	Dog	Mammalia	Piles
16	<i>Bos spp</i>	Cow	Mammalia	Removes scars For poisonous bites Leprosy
17	<i>Homo sapiens</i>	Human	Mammalia	Eye disorders in infants Antiseptic for wound healing
18	<i>Hirundo medicinalis</i>	Leech		Skin diseases
19	<i>Lycosa spp.</i>	Spider		Ear pain Liver swelling
20	<i>Apis sps</i>	Honeybee		Liver swelling
21	<i>Periplanata americana</i>	Cockroach		Asthma
22	<i>Helix aspersa</i>	Garden snail		Tuberculosis Cough and cold

A. Analysis of Sankha bhasma

During our study, the sankha bhasmas were assayed in XRF spectroscopy and is shown in Fig.1. In this investigation, it was found that the presence of major, minor and trace elements in samples. In Sankha bhasma, CaO (96.568%) and SiO₂ (1.125%) were found as the major elements were found during the XRF analysis. Depending upon their concentration of different compounds are presented as minor element and trace element as Al₂O₃ (0.897%), SO₃(0.535%), Fe₂O₃(0.219), SrO (0.406%), Cl(812.9ppm),TiO₂(479.4ppm),MnO(73.9ppm),CuO(80.2ppm), ZnO(220.9ppm), As₂O₃(9.4ppm), ZrO₂(37.4 ppm), SnO₂(484.0ppm), CeO₂(270.5ppm), Lu₂O₃(14.8ppm), PbO(15.0ppm) and Re (6.6ppm). This bhasma has been widely used by physician to cure dysentery, indigestion, gonorrhoea, dyspepsia, jaundice, acne, hepatomegaly, loss of appetite, heartburn, acid reflux and also hyperacidity gas problems. Shankhavati as a medicine or pill is prepared from shell of coach. It is mostly used to treat sore throat, chronic dysentery, dyspepsia, diarrhoea, cough and asthma. Coach shell is also useful for curing of ophthalmological problems including night blindness and colour blindness, especially in children. Purified Shankhabhasma has cytoprotective properties as an antioxidant in gastric tissues [17,18].

B. Mukta Bhasma

During analysis of Mukta bhasma, CaO (97.325%) was found as the major element. Some of the elements were as minor elements like AL₂O₃(0.850%), SiO₂(0.639%), SO₃(0.280%), Cl(0.185%), MnO (0.140%), Fe₂O₃(0.268%) and SrO(0.130%). The trace elements were K₂O(733.0ppm), TiO₂(382.5ppm),V₂O₅(88.2ppm),ZnO(193.9ppm), As₂O₃(36.8ppm),Br(13.1ppm),ZrO₂(10.5ppm),SnO₂(322.7ppm), Yb₂O₃(1.0ppm), Lu₂O₃(8.3ppm), PbO(11.1ppm) and Re(32.3ppm).These elements are represented in Fig.2.This bhasma has been widely used by physician to cure the diseases likely depression, hypertension, ulcer, acidity, tooth decay, bone related problems, headache, frequent urination and muscular pain[19].

C. Cowry Bhasma

The ash or bhasmas are prepared from *Cypraea moneta* called as as varatika bhasma. It is utilized in the treatment of enlarged liver, spleen, jaundice, dyspepsia, cough and asthma. These are used also as external ointments and also have anti-ulcer effects. Varatika Bhasma has antiulcer effects. Standardisation of this bhasma reduces toxic effects and improves effectiveness [20]. This bhasma as medicine has been used to treat abdominal pain, irritable bowel syndrome, duodenal ulcer and loss of appetite etc [21]. During analysis which is represented in Fig.3 CaO (97.69%) was found as major element. Al₂O₃(0.632%), SO₃(0.380%), Cl(0.447%), K₂O(0.213%), and SrO (0.397%),ZnO(86.1%),Br(34.1%) were the minor elements. Trace elements were TiO₂, MnO, Fe₂O₃, ZrO₂, SnO₂, CeO₂, Sm₂O₃, EuO₃, Er₂O₃, Yb₂O₃, Lu₂O₃ and Re.

D. Muktasukti Bhasma

During analysis of muktasukti bhasma SiO₂(4.253%) and CaO(92.461%) were found as major elements and Al₂O₃(0.873%), SO₃(0.380%), Cl(0.178%), TiO₂(0.235%), Fe₂O₃(0.693%), ZnO(0.119%) and SrO(0.347%) as minor elements.MnO(198.2ppm),V₂O₅(8.6ppm),R₂O₃(79.5ppm),CuO(443.4ppm),As₂O₃(16.5ppm),ZrO₂(152.4ppm),SnO₂(155.

7ppm),K₂O(0.317%), Sm₂O₃(135.4ppm), OsO₄(0.9ppm), HgO(240.8ppm) and PbO(6.7ppm) were found in trace. This is shown in the graph as in Fig.4.This bhasma is prepared by special calcinations of pearl. It is used for curing heart disease, Pain, cough, ligament disease, fever,haematological disorder, indigestive impairment and as a source of calcium etc[22]. It is reported that oyster shells in diet has increased the bone mineral density in elderly patients. These bhasma were preferred for the treatment of mainly gastro-intestinal disorder like chronic gastritis, duodenal ulcer, peptic ulcer, acidity, heart burn, abdominal distension, bloating, mouth ulcer, ulcerative colitis, loss of appetite, indigestion and also for back pain, osteoporosis.

E. Pravala Bhasma

This bhasma has also been used for curing cough, pulmonary tuberculosis, bleeding problem, calcium deficiency, general debility, ulcer, fungal infection, burning sensation in urine, arthritic, fever, depression, hea asthma, piles, osteoporosis, osteoarthritis, menstrual pain, post-menopausal problems, oligospermia, premature gray hair, excessive uterine bleeding, calcium deficiency, cardiac fibrillation, eye diseases, rickets, diabetes mellitus, skin diseases, etc. Coral ash is used often for curing of different cancers like lung cancer, breast carcinoma, lung cancer, uterus cancer and stomach cancer [23]. Coral is also used diversely as medicine in Unani system. It is utilised in the treatment of gastric disorder, enlargement of spleen, piles, melancholia, epilepsy, palpitation and renal calculi. The element analysis of this bhasma was done in XRF which is represented in Fig.5. AL₂O₃ (1.102%), SiO₂ (4.885%), CaO (90.809%) were detected as major element and SO₃ (0.942%), Cl (0.160%), Fe₂O₃ (0.701%), SrO (0.612%), SnO₂ (0.663%) found as minor elements. Trace elements were as follows including TiO₂(546.6ppm),V₂O₅(65.2ppm),Cr₂O₃(69.3ppm), Mn O (163.2ppm),Zno(198.5ppm),As₂O₃(19.ppm),SrO(0.112ppm),ZrO₂(52.8ppm), Sm₂O₃(0.0ppm), Eu₂O₃(59.5ppm), PbO(25.2ppm), CO₂(0.0ppm), Yb₂O₃(50.8ppm) and Re(8.5ppm).

F. Kukkutandatvak Bhasma

As poultry is one of the livelihoods for the local tribal people and it is easily available there. So, this bhasma also put an advantage on other drugs in Ayurvedic treatment. It provides calcium as an essential source for human diet. Egg shell of hen is composed of about 97% of Calcium Carbonate. It neutralizes the acid in our body [24]. As we have done XRF analysis of several bhasmas which have been using for Aurvedic treatment and Kukkutandatvak bhasma was one of them in Fig.6. During XRF analysis the following elements were found as major elements. These elements were SiO₂(1.211%) and CaO(96.158%)but minor elements were SO₃(0.554%), Cl(0.116%), Fe₂O₃(0.446%), SrO(0.127%) and SnO₂(0.408%). TiO₂(811.8ppm), V₂O₅(60.9ppm), Cr₂O₃(56.8ppm), MnO(36.2pm), CuO(97.3ppm), ZnO(371.9ppm),As₂O₃(36.7ppm),ZrO₂(45.3ppm),Sm₂O₃(0.0ppm), Yb₂O₃(8.1ppm), Lu₂O₃(24.8ppm), HgO(48.0ppm) and PbO(57.5ppm) were in trace during this analysis. For the treatment of anti-arthritis, osteomalacia, osteoporosis, low bone mineral density and also for anti inflammation this bhasma was widely used by Ayurvedic doctors as calcium supplement. It gives better response than other therapeutic drugs in local people.



G. Honey

Honey is the natural sweet which behaves as medicine. Honey along with Bhasma give good results in therapeutic response. It also exhibit non-toxic with antioxidant activity in human. These are associated with superoxide dismutase and catalase to reduce free radicals. The XRF analysis has represented in Fig.7.

IV. CONCLUSION

Presence of metals in medicine sometimes considered as toxic, but these metals play a very crucial role for carry out various biological functions. Often their deficiency may create serious health problems. People prefer to take Ayurvedic bhasmas as these are more effective without any toxic effect. This study gives us the purity of the bhasma including its carbonates and oxides. Now it has given novel health care look in Ayurvedic science for better treatment.

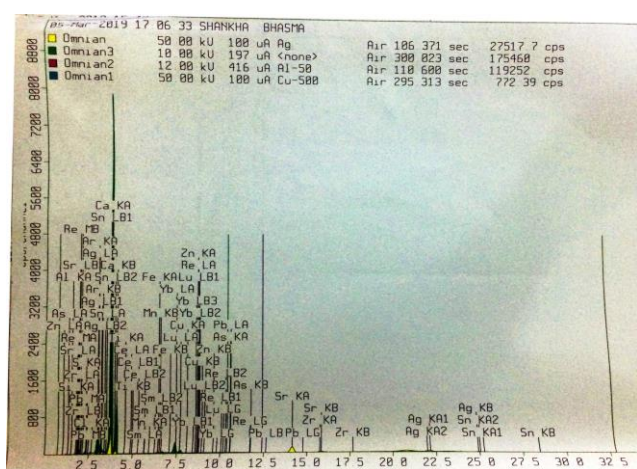


Fig.1. XRF analysis of Sankha Bhasma

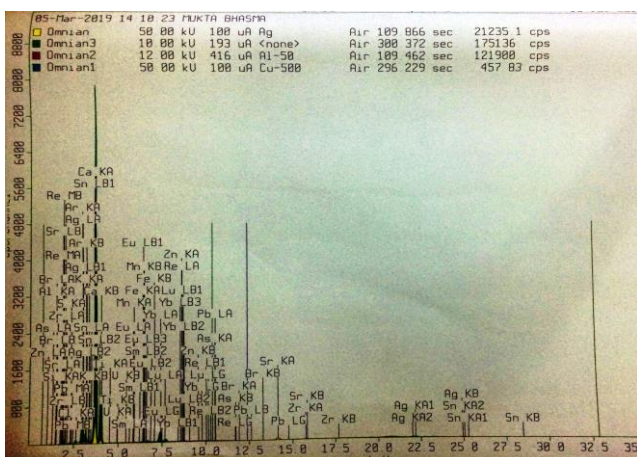


Fig.2. XRF analysis of Mukta Bhasma

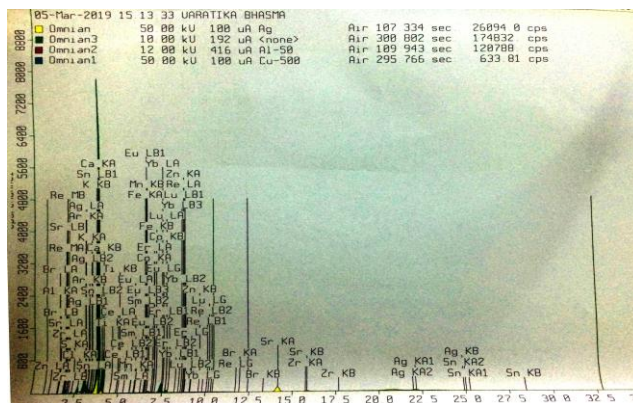


Fig.3. XRF analysis of Varatika Bhasma

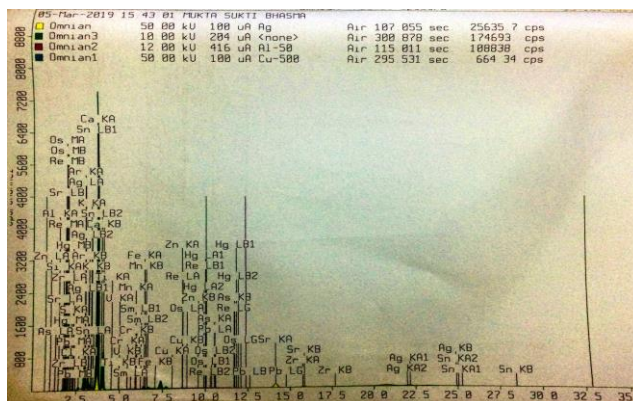


Fig.4. XRF analysis of Mukta Soukti Bhasma

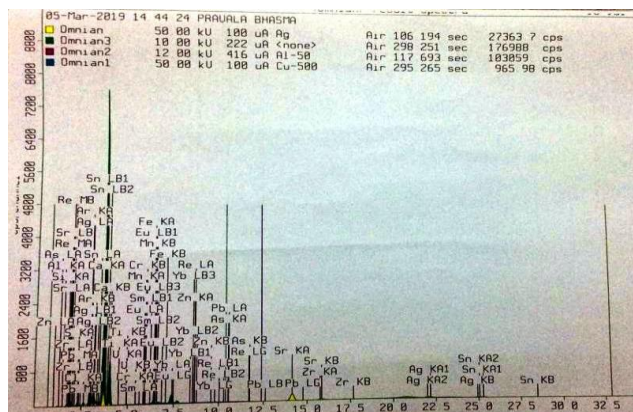


Fig.5. XRF analysis of Pravala Bhasma

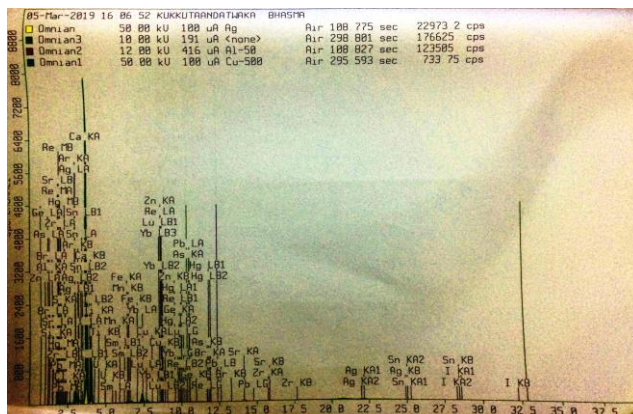


Fig.6. XRF analysis of Kukkutaandtvak Bhasma

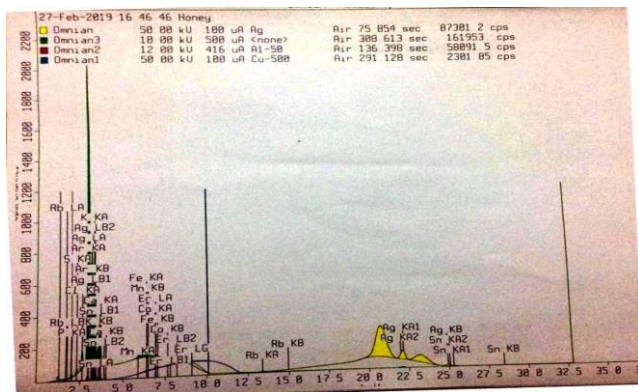


Fig.6. XRF analysis of honey.

REFERENCES

- Pal D, Sahu CK and Haldar A: Bhasma: The ancient Indian nano medicine. Journal of Advanced Pharmaceutical Technology and Research 2014 ; 5(1):4-12
- Pushpangadan P, George V, Sreedeevi P,Ijini TP and Ninawe A: Ethnozoological Knowledge of Indian scheduled tribe,scheduled caste and rural communities. Indian journal of traditional knowledge 2014;13(4):735-741.
- Unnikrishnan PM: Animals in Ayurveda. Amruth. 1998; 1(3):1-23.
- Alves RR and Rosa IL: Why study the use of animal products in traditional medicines?. Journal of ethnobiology and ethnomedicine 2005;1(1):5.
- Pareek A and Bhatnagar N: Revisiting ancient therapeutic potential of Ayurvedic Bhasma. International Journal of Pharmaceutical Sciences and Research 2018; 9(8): 3150-3165.
- Dubey N, Dubey N, Mehta RS, Saluja AK and Jain DK: Anti-Ulcer activity of a traditional pearl preparation:Mukta Bhasma. Research Journal of Pharmacy and Technology 2009;2(2):287-290.
- Dalal SK: Systematic study of rajata (Silver)Bhasma prepared by traditional Ayurvedic method. International Journal of Ayurveda and Pharmaceutical Chemistry 2017; 6(2): 150-163.
- Somil D, Deepti G and RamMohan GR: Standardisation of Yogaamruto Rasa by using Modern Analysis techniques. International Journal of Research in Ayurved and Pharmacy 2016;4(7):27-33.
- Gheldof N and Engeseth NJ:Antioxidant capacity of honeys from various floral sources based on the determination of oxygen radical absorbance capacity and inhibition of invitro lipoprotein oxidation in human serum samples.Journal of Agricultural and Food Chemistry 2002; 50 (10): 3050-3055.
- Buba F, Gidado A and Shuguba A: Analysis of biochemical composition of honey samples from North-East Nigeria.Journal of Biochemistry & Analytical Biochemistry 2013; 2(3): 139 X
- Joshi B: Studies of traditional Ayurvedic bhasmas containing Ca,Cu,Sn,As,Ag,Zn,S and Pb using XRF,XRD and FTIR. International Journal of Current Research 2017 ; 9(8):56867-56874.
- Latorre MJ,Pena R,Gracia S and Herrero C: Authentication of Galician (NW Spain) honeys by multivariate techniques based on metal content data. Analyst. 2000; 125(2):307-312.
- Chan K: Some aspects of toxic contaminants in herbal medicines.Chemosphere2003;52(9):1361- 1371.
- Anonymous: District Family Planning Plan-district:Mayurbhanj.2013;1-44
- Das D: Ethnozoological practices among tribal inhabitants in Khowai districts of Tripura, North-East India. Journal of Global Biosciences 2015;4(9):3364-3372.
- Madhavi N,Kumar AE and Maheswar T : X-ray diffraction and X-ray florescence analysis of Vanga bhasma :an Ayurvedic metallic prepararion. International Journal of Research in Ayurveda and Pharmacy 2016;7(1):57-59.
- Sur TK, Pandit S, Sen S,Bhattacharyya D and Debnath PK: Anti-ulcer activity of Sankha bhasma (calcinated conch shell).Exploratory Animal and Medical Research 2013;3(1):48-56.
- Pandit S, Sur TK, Jana U, Bhattacharyya D and Debnath PK. Anti-ulcer effect of Shankha bhasma in rats: a preliminary study. Indian Journal of Pharmacology 2000;32(6):378-380.
- Gawalkar SS and Jadar PG: A novel approach for quality control of the bhasmas of muktashukti, and shankha. Annals Ayurvedic Med. 2017;6 (3) 98-105

- Rasheed PS and Shivashankar M: Preparation and characterisation of metal oxide as nano particles-Varatika Bhasma.Mechanics,Material science and Engineering 2017;9:206-210.
- Shetye MA and Maladkar CS:Pharmaceutico-analytical study of varatika bhasma with special reference to its types according to Rasatarangini.Ayurpub 2016;1(4):153-159
- Dubey N, Dubey N,Mehta RS,Saluja AK andjain DK:Physicochemical and pharmacological assessment of a traditional biomedicine:Mukta shoukti bhasma. Songklanakarinn Journal science and technology 2009;31(5):501-510.
- Lata S and Biradar RS: Physio-chemical analysis of Praval Bhasam - Prepared by using Praval Mool as raw material. International journal of Ayurvedic and herbal medicine 2015;5(4):1955-1963.
- Singh TR,Fanasiya KM,Bedarkar P,Patgiri BJ and Prajapati PK: Analytical profile of Kukkutandatvak bhasma(incinerated hen egg shells) prepared by two different methods.Ayu 2017;38(4):158-164

AUTHORS PROFILE



Sitaram Swain was born in Odisha,India ,in 1986. He has completed his PhD degree under Utkal University in the year 2017. Currently he is working as Assistant Professor in the Department of Zoology under Centurion University of Technology and Management, Odisha. Previously he was trained and experienced at TATA Memorial Hospital, Mumbai,India (The largest cancer hospital of Asia). He has also experienced with clinical biochemistry, immunofixation,immunoassay, cancer cytogenetic, serum protein electrophoresis and tumour marker analysis. He has more than 5 years of research experience in the field of cancer. He is also associated diabetic division as working with Novartis pharmaceutical. Currently his current areas of research related to public health and epidemiological study of different diseases in Odisha.He has also several research articles regarding this areas of research.his research interest include biochemistry,haematology and cytogenetics related to public health.



Tapasi Upadhyaya was born in Odisha. She has completed her Master of Science and Master of Philosophy degree in Zoology. She has interested ethnomedicinal study of animal products. She has two research publication related to public health in Odisha,India.