



TRIBAL TREATMENT OF JAUNDICE TRADITIONALLY THROUGH SARGI CHAPDA IN BASTAR, C.G, INDIA

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ABSTRACT

The paper deals with the traditional treatment of Jaundice through Sargi chapda (Cheeti Chapda) popular among the tribes of Bastar. A survey among villages of Bastar showed that Chapda is used to cure Jaundice. It was found that a species of ant known as *Oecophylla smaragdina* which contain formic acid when spread on the patient's body their sting cured Jaundice. Experimentally after adding 2-3 drops of extract of Chapda to approx. 2 ml of dark yellow colored urine obtained from patient suffering from Jaundice, caused increased acidification due to which yellow-greening reaction occurred which concluded that yellow bilirubin was encouraged to oxidize to green biliverdin. Spectrophotometric analysis at 546 nm showed that when 2-3 drops of extract was added to 200 µl of blood serum of patient, concentration of bilirubin declined to 1.008 mg/dl which was 29.808 mg/dl earlier before the extract which concluded that formic acid of Chapda reduces excess concentration of bilirubin in blood.

Key words: Cheetichapda, Sargi chapda, *Oecophylla smaragdina*, bilirubin, biliverdin, Jaundice

INTRODUCTION

Bastar is one of the districts of the state Chhattisgarh in India which is the land of tribes. Its 70% of the total population comprises of tribes which is 26.76% of the total tribal population of C.G.^[1] Tribal people of Bastar are popular for their incredible tribal culture and heritage throughout the world. Each and every tribal group of Bastar possess their own specific culture and traditions which differ from each other in costumes, traditions etc.

Traditional healing is the oldest form of structured medicine i.e. a medicine having underlying philosophy and set of principles by which it is practiced. Traditional healing was originally an integral part of semi-nomadic and agricultural tribal societies, and although archaeological proof for its existence dates back to only around 6000 B. C., its origins probably dates back from well before the end of the last Ice-age. WHO defines traditional healing as “the sum total of knowledge, skills and practices based on the theories, beliefs and experiences

indigenous to different cultures that are used to maintain health, as well as to prevent, diagnose, improve or treat physical and mental illness”.

Among various types of traditional healing practices popular among Bastar tribal population of Bastar, traditional treatment of jaundice through Sargi Chapda also known as “cheeti chapda” is one. Sargi chapda is one of the important examples of sustainable living traditions from the rural backyards of India. Chapda is a particular delicacy for the tribes of the Bastar because they make chutney out of them. One of the species of ant family known as “chapda” whose scientific name is *Oecophylla smaragdina* (common names include weaver red ant, green tree ant), belonging to the family of *formicidae*, makes shelter on the leaves of Sargi trees. *Oecophylla smaragdina* make nests for themselves out of the leaves of the tree using their saliva as the adhesive to join the leaves and glue them together with larval silk.^[2] The literal meaning of chapda is a basket made out of the leaves, in all probability the word was coined after observing the nest of chapda.

One of the oldest belief among the tribes is that if a nest of *Oecophylla smaragdina* or chapda along with its occupants, is spread over the body of a patient, their sting would prove a sure cure against any illness. Traditionally among the tribes, treatment of Jaundice through Sargi chapda is very popular. Reason behind this traditional healing of jaundice through Sargi chapda is still unrevealed among the tribes.

The main objective of this paper is to focus on this traditional knowledge of treatment of Jaundice through Sargi chapda in present scenario and to explain the chemistry behind this treatment.

MATERIAL AND METHOD

Study area: A survey on the tribal treatment of Jaundice through Sargi chapda was carried out in four villages of Bastar i.e. at Karanji, Bade murma, Titirgaon, Gola palli. Information was gathered about the patients from the Sarpanchas of Gram Panchayats of all the four villages. Later survey was carried out after visiting the home of the patients at their respective villages in order to have an enquiry about their treatment method.

Sample Collection: To explain the chemistry behind the treatment about 20 ml of urine sample of patient suffering from jaundice was collected out from BSR diagnostic lab located at Naya Para, Jagdalpur. To calculate the concentration of bilirubin in the blood of patient before and after adding the formic acid, 500 μ l blood serum samples was also collected out from the same lab. For extraction of formic acid from chapda, about 500 gm of cheeti chapda was bought from Sanjay market, Jagdalpur.

Treatment: Treatment of all the four patients were performed with the help of cheeti chapda obtained from Sargi tree present nearby their homes. Little bit amount of cheeti chapda containing live red weaver ants were spread over the body of patients suffering from Jaundice and were observed for four-five days for their recovery.

Extraction of formic acid from Chapda: For extraction of formic acid from chapda, about 500 gm of dead chapda was crushed outand exhaustively extracted with water in a soxhlet apparatus for approx. 8 hrs. The resulting extract was filtered through Whatmann filter paper and was dried on water bath. The residual extract after drying was stored in airtight bottles for further procedure.

Conversion of bilirubin into biliverdin: To convert bilirubin into biliverdin, 2-3 drops of formic acid extracted out through soxhlet apparatus from Sargi Chapda were added to approximately 2 ml of dark yellow coloured urine obtained from patient suffering from Jaundice and kept for 24 hrs for observation of yellow green reaction.

Quantitative analysis of bilirubin: For quantitative analysis of bilirubin in the blood of patient suffering from jaundice, 200 μ l of blood serum was taken in one test tube to which 200 μ l of reagent 1 i.e. R1 (30 mmol/l sulphanic acid and 0.20 N HCl), one drop of reagent 2 i.e. R2 (30 mmol/l sodium nitrite), 2ml of saline solution and 2-3 drops of formic acid was added while in other test tube same solution was prepared but no formic acid was added taken as blank. Spectrophotometric analysis of both the samples was performed at 546 nm and specimen absorbance was estimated and concentration of direct bilirubin in mg/dl was calculated.

Calculation: Direct bilirubin concentration =
Specimen absorbance x 14.4 = mg/dl

RESULTS

Treatment: After observations for the recovery of patients from Jaundice treated with cheeti chapda, results obtained were tabulated in the table 1.

Conversion of bilirubin into biliverdin: After adding formic acid extracted out from Chapda to the urine sample obtained from the patient it was resulted out that yellow coloured urine sample got converted into green colored solution.

Quantitative analysis of bilirubin: After performing spectrophotometric analysis at 546 nm, specimen absorbance of the blood serum sample earlier before adding formic acid and after adding formic acid, and calculation of direct bilirubin concentration in mg/dl before and after adding formic acid is tabulated in table no.2.

DISCUSSION

After a detail survey performed among four villages of Bastar, it was found out that all the four patients suffering from Jaundice when treated with sargi chapda, all the patients were started recovering faster and completely recovered after four days. After a detail study it was found out that the reason behind this complete treatment of Jaundice through sargi chapda is the action of formic acid present in the venom of ant *Oecophylla smaragdina*^[2] as shown in

“figure 1” and “Figure2” and “Figure3” which makes shelter on the tree in the form of nests by weaving together the leaves using larval silk. [3] Worker ants (*Oecophylla smaragdina*) are used in traditional medicine in India and China as shown in “Figure 4” and “Figure5”. [4,5]

Jaundice is a yellowish pigmentation of the skin, the conjunctival membranes over the sclera and other mucous membranes due to excess amount of bilirubin (yellowish colored pigment) derived from haem pigments in the extracellular fluid. [6] Normal concentration of bilirubin in blood plasma is below 3.4–17 $\mu\text{mol/L}$ (0.2–1 mg/dL) under total bilirubin in serum. [7]

Large amounts of blood flow each minute through the liver which break down old, inefficient red blood cells in a process called hemolysis, which releases large amounts of bilirubin. The bilirubin leaves the liver via the bile ducts which is generally stored in the gallbladder and is slowly released into the intestine and helps to digest the food in the intestine which finally exits the body through stool. Excess amount of bilirubin is toxic and causes jaundice; therefore it is important to eliminate it from the body immediately when produced.

According to James H. Bedino (2005) [8], haem gets converted to bilirubin in two enzymatic steps as shown in “Figure 6”. Firstly the enzyme haemeoxygenase causes the haem ring to open, releasing its constituent iron giving the product carbon monoxide and biliverdin (green colored pigment). Secondly, biliverdin reductase reduces biliverdin to bilirubin, via the reduction of a double bond between the second and third pyrrole ring into a single bond releasing it into the blood.

Temporarily or permanently damaged liver reduces its ability to breakdown bilirubin and its transfer to gall bladder. Sometimes the gallbladder become blocked preventing its excretion into the intestine which leads bilirubin back up into the liver and then into the bloodstream. During survey when it was found out that the ant *Oecophylla smaragdina* present in Sargi chapda when sprayed over the body of patient as shown in “Figure 7” & “Figure 8”, the ant sprayed its formic acid through its sting. Result showed that when 2-3 drops of formic acid was added to the urine sample of the patient and kept for 24 hrs it was found that yellow colored urine got converted into green colored solution as shown in “Figure 9”, through which it was concluded that yellow colored bilirubin oxidized into green coloured biliverdin when formic acid was added.

According to James H. Bedino (2005), formic acidification ensures colour changes in jaundice. [8] He explained that bilirubin gets oxidized to biliverdin in tissues by this formic acidification, similarly to the standard lab test for bilirubin where oxidation by acids causes its conversion into greenish biliverdin as shown in “Figure10” and other darker coloured derivatives to appear. Biliverdin is also replenished in the cycle from haem units through hemeoxygenase [9] present in formic acid. In this way lastly it could be concluded that excess amount of bilirubin is detoxified by their conversion into biliverdin through the use of Sargi chapda.

\ Normal concentration of bilirubin in blood plasma is below 3.4–17 $\mu\text{mol/L}$ (0.2–1 mg/dL) under total bilirubin in serum. [7] Quantitative estimation showed that before adding formic acid to the blood serum, the direct bilirubin concentration in blood serum sample was 29.808 mg/dl which immediately declined to 1.008 mg/dl after adding formic acid as shown in “Figure 11” after which it could be concluded that excess amount of bilirubin could be minimized immediately after spraying chapda over the body of patients suffering from jaundice through by which formic acidification occurs through the sting of *Oecophylla smaragdina*.

Moreover it should also be noted that the formic acid present inside the ant *Oecophylla smaragdina* remain in naturally buffered form which balances the Ph of the body and doesn't cause any harm to the human bodies. Synthetic formic acid present in chemist labs doesn't remain in buffered condition.

CONCLUSION

Lastly after performing the above mentioned survey among the tribal people of Bastar it can be concluded that the present investigation clearly explains the relevance of tribal treatment method of Jaundice through Sargi chapda, through the explanation of colour changes i.e. conversion of yellow coloured bilirubin into green coloured biliverdin in Jaundice after spray of formic acid which causes oxidation of bilirubin into biliverdin through the sting of *Oecophylla smaragdina* present in Sargi chapda leading to the detoxification of bilirubin from the body. Quantitative analysis also explains that excess amount of bilirubin in the blood could be detoxified and minimized from the boy through the sting of chapda.

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Figure7:

Figure 8:

Figure 7 & 8: showing Sargi Chapda sprayed over the body of patient in which the ant present sprays formic acid through its sting.



Figure 9: showing conversion of yellow coloured bilirubin into green coloured biliverdin

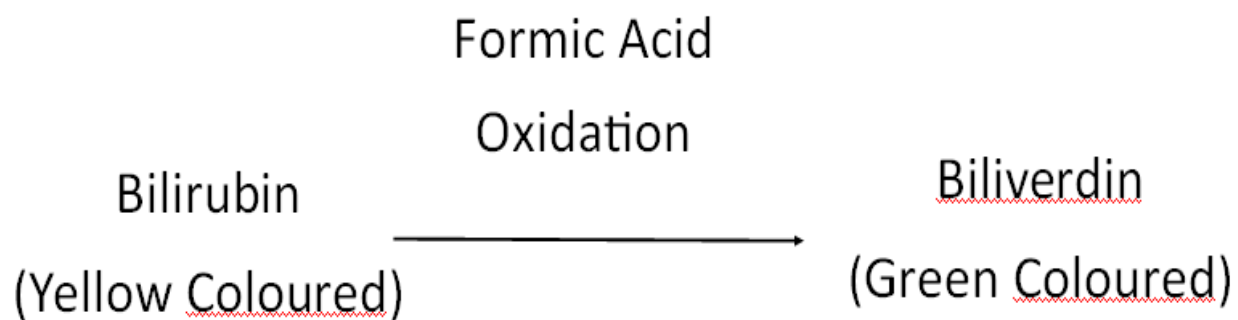


Figure 10: showing the conversion of bilirubin into biliverdin.

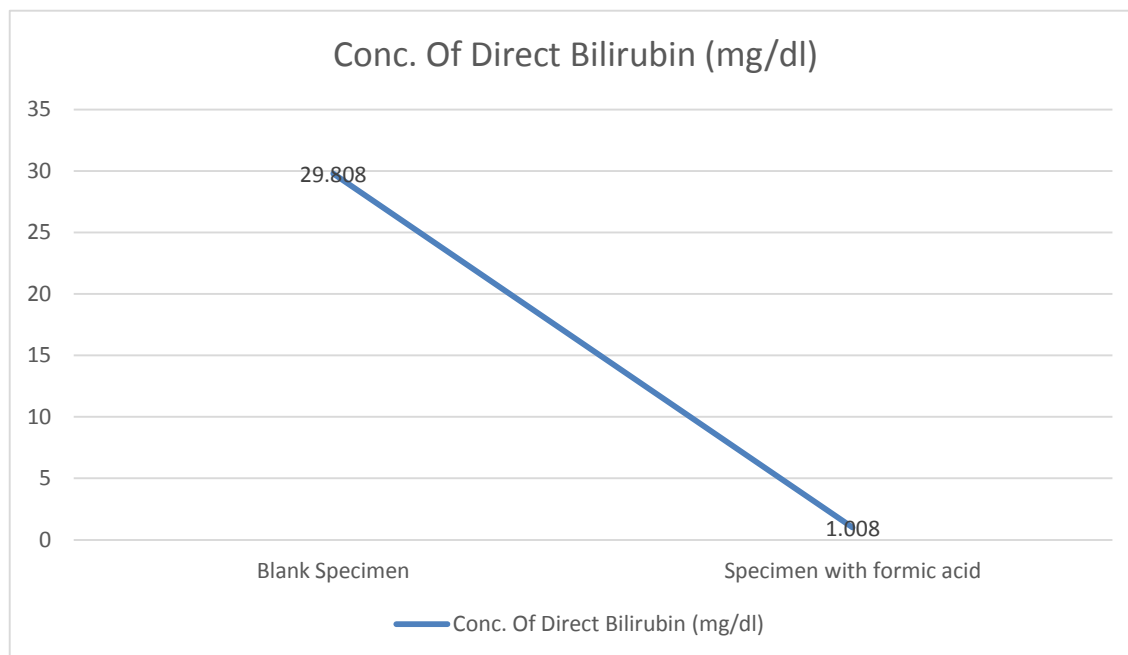


Fig 11: Graphical representation showing decline in the direct bilirubin concentration before and after adding formic acid extracted from Chapda

Table 1. Tabulation showing the result of the survey carried out for the treatment of Jaundice through SargiChapda.

S.No.	Name of the patients	Village	Treatment	Results
1.	Budhru Ram Baghel	Karanji	Through Cheeti Chapda	Recovered
2.	Janki Prasad	Bade murma	Through Cheeti Chapda	Recovered
3.	Ganga Ram Singh	TitirGaon	Through Cheeti Chapda	Recovered
4.	ChunnuSori	Gola Palli	Through Cheeti Chapda	Recovered

Table 2. Tabulation showing the result of specimen absorbance and direct bilirubin concentration before and after adding formic acid through spectrophotometric analysis of the specimen at 546 nm

S.No.	Specimen	Wavelength (nm)	Specimen absorbance (abs)	Direct bilirubin Concentration (mg/dl)
1.	Serum sample before adding formic acid	546	2.07 abs	29.808
2.	Serum sample after adding formic acid	546	0.07 abs	1.008

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