

Screening the antibacterial activity of *Scutellaria baicalensis* against human and animal pathogens.

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Abstract - Aquaculture represents one of the fast growing food producing sectors of the world and aims in increase the productivity per unit space. Recently due to intensive farming practices infectious diseases pose a major problem in aquaculture industry causing major problem. Hence an attempt has been made to study the invitro antibacterial activity of *Scutellaria baicalensis*. The study revealed that among the organisms tested *V.chloerae* showed maximum zone of inhibition against the methanol extract of *Scutellaria baicalensis* (40±1). Thus the study revealed that *Scutellaria baicalensis* good antibacterial activity.

Key Words: Invitro, inhibition zone, diameter, pathogen, animal, human.

1. INTRODUCTION

Aquaculture represents one of the fast growing food producing sectors of the world and aims in increase productivity per unit space. Among various kinds of cultivated organisms, many marine and freshwater finfish and shellfish species constitute an important industry with their production increasing every year. Recently due to intensive farming practices, infectious diseases pose a major problem in aquaculture industry, causing heavy loss to farmers. In order to address this problem, several studies have been conducted on the modulation of fish immune system in order to prevent the outbreak as reviewed recently (Sakai 1999). Disease outbreaks are increasingly being recognized as a potential constraint on aquaculture production and trade and probiotics and bio augmentation methods for the improvement of aquatic environmental quality as major for further research in disease control in aquaculture (Subasinghe 1997). The use of expensive chemotherapeutants and antibiotics for controlling disease have widely been criticized for their negative impacts like accumulation in the tissue as residues development of the drug resistance, immunosuppressant and reduced consumer preference for food fish treated with antibiotics.

Plants or their by products are preferred since they contain several phenolic, polyphenolic, alkaloid quinone, terpenoid, lectine and polypeptide compounds, many of which have been shown to be very effective alternatives to antibiotics, chemicals, vaccines and other synthetic compounds. In aquaculture, the herbal medicines are also known to exhibit

anti-microbial activity facilitate growth and maturation of cultured species besides under intensive farming, the antistress characteristics of herbs will be of immense use without posing any environmental hazard.

Scutellaria baicalensis George is widely distributed throughout the world, mainly in Asia known as Hanging in Chinese and organ in Japanese. The local / Regional name of *Scutellaria baicalensis* is called as imbra used as an healing agents for wound or any inflammation. (Guo et al., 1999). For several thousands of years herbal products have been used as medicines in Asia. *Scutellaria baicalensis* is one of the important medicinal herbs widely used for the treatment of various diseases such as viral hepatitis, bronchitis as well as tumours contemporary. Based on traditional Chinese medicine this drug is considered to be a detoxification and damp removing agent and unblocks the lung and stomach meridians. Therefore it can be used to treat diseases related to respiratory and digestive systems (Huang (1999; Kubo et al., 1994).

Yi.Nan et al., (2011) discussed the total flavones in *Scutellaria baicalensis* and its antimicrobial activity. Cong Song et al., (2012) analysed the inhibition of quorum sensing activity by ethanol extract of *Scutellaria baicalensis*. Chaolan Guo et al., (2014) discussed the Chinese herbal medicine additives in aquaculture. Bishnu et al., (2015) discussed the evaluation of antibacterial activity of some traditionally used medicinal plants against human pathogenic bacteria. Kencham-Fai Leung et al., (2016) analysed the synergistic antibacterial effects of Nanoparticles encapsulated with *Scutellaria baicalensis*. Hence an attempt has been made to study the invitro antibacterial activity of *Scutellaria baicalensis* against animal and human pathogens.

2. MATERIALS AND METHODS

The flesh part of plant species namely *Scutellaria baicalensis* were collected from paddy fields of Pattukkottai (10.425°N, 79.3140°E) of Thanjavur district of Tamil Nadu, India. About one gram of sterilized plant parts were ground in mortar and pestle with 10 ml aqueous and organic solvent (Ethanol, Methanol). It was filtered and the supernatant was stored for antibacterial screening. (Rao and Satyanarayan, 1997). The *E.coli* and *Staphylococcus aureus* isolated from clinical sample (Chandrakala et al., 2003) and the *V.cholerae* and *V.parahaemolyticus* was isolated from diseased *Penaeus*

monodon (Chandrakala and Ayyavoo, 2006) were used for the study. The antibacterial activities of leaf part of plants were tested against the selected pathogen the nutrient agar and TCBS agar plates were prepared (Himedia, Mumbai pH 7±0.1, 8±0.2) swab was made with fresh bacterial culture with 10-4. CfU/ml (18hrs old). The discs were impregnated with various extracts and impregnated over the lawn. The plates were incubated for 24 hrs and after 24 hrs the plates were observed and the zone of inhibition was measured. Distilled water was used as negative control and ciprofloxacin was used as positive control. (Bauer et al., 1962).

3. Results

The study on the antibacterial activity of *Scutellaria baicalensis* revealed the following observations. The antibacterial activity against the human pathogen such as *E.coli* against ciprofloxacin (positive control) showed the inhibition zone of 16±1 mm diameter and the *Staphylococcus aureus* showed the animal pathogen *V.cholerae* showed the diameter 24± 1mm. The *V.cholerae* showed the diameter of 38+ 1 mm and 40±1 mm diameter. *V.parahaemolyticus* revealed the presence of 27± 1 mm diameter zone. The *staphylococcus aureus* showed 15±1 and 14.7±1.7 mm zone of inhibition against ethanol and methanol extract. The study revealed that among the pathogens tested *V.cholerae* showed maximum zone of inhibition (Table I).

Table I : ANTIBACTERIAL ACTIVITY OF *Scutellaria baicalensis*

S.No	Bacteria	Zone of inhibition (mm)				
		Negative control	Positive Control $\bar{X} \pm SD$	Aqueous Extract	Ethanol Extract $\bar{X} \pm SD$	ethanol $\bar{X} \pm SD$
1.	<i>E.coli</i>	-	16±1	-	24±1	24±1
2.	<i>Staphylococcus aureus</i>	-	19±1	-	15±1	14.7±1.7
3.	<i>Vibrio cholerae</i>	-	28±1	-	38±1	40±1
4.	<i>Vibrio parahaemolyticus</i>	-	23±1	-	29±1	27±1

Note: \bar{X} = mean

$\bar{X} \pm SD$ - Deviation from mean

4. Discussion

Adonizio et al., (2006) Anti- quorum sensing activity of medicinal plants *Scutellaria baicalensis* Georgi, also named Huang-qin has been used since ancient time in China to treat allergic and inflammatory diseases by the mechanisms known as "Cleansing heart" drying moisture and removing toxins. Ikemoto et al., (2000) analysed the T.Antitumor effects of *Scutellariae radix* and its components baicalein, *Scutellaria baicalensis* is a traditional chinese medicine frequently infectious and inflammatory diseases for thousands of years.

Cai et al., (2008) analysed the protective effects of baicalian on ligature-induced periodontitis in rats, previous studies

have confirmed that baicalin, a flavonoid compound isolated from SB, possesses marked anti-inflammatory, antioxidative and immunomodulating effects, Jang et al., (2014) discussed the combination effects of baicalein with antibiotics against oral pathogens, a recent study indicates that the combined use of another compound baicalein present in SB with antibiotics has synergistic effects against oral bacteria. Kong et al., (2009) analysed the spectrum effect relationships between ultra-performance chromatography, incubation of *E.coli* B with *S.baicalensis* produced reduction zones in addition to the kill zones. The reduction zone was an area that, although not entirely clear of microbial growth, was still far clearer than the areas of the plate with uninterrupted microbial growth. Mehendale et al., (2007) *Scutellaria baicalensis* and a constituent flavonoid, baicalein,attenuate ritonavir-induced gastro intestinal side effects, The major phytochemicals isolated from *S.baicalensis* are chrysin, baicalin, baicalein-7-O-D glucopyrinase, Wogonin, Wogonoside,5,6-dihydroxy-7-O-glucosideflavone. Makino et al., (2008) analysed the comparison of the major flavonoid content of *S.baicalensis*, the tenaxin- I, tenaxin- II, Scutevurin, Scutellarien, Eriodictyol, Methoxyflavone, skullcaptavone II Viscidulin III, Salvigenin, Tetrahydroxyflavone, ganhuan genin, isoscutellarien 8-O-D glucurodine, wogonin-5-O-D-glucoside,dihydrobaicalin,dihydrooxylin A, Cathadmidin, Carthamidin 7-O-D glucuronide isocarthamidin, isocarthamidin-7-O-D-glucuronide ,dihydrohispidulin, martynoside, salidroside, darendoside A and B, scutebaicalin, scutaplin L. *Scutellaria baicalensis* is the most widely used medicinal plant in traditional Eastern medicine. The antibacterial activity of *S. baicalensis* revealed that the plant showed maximum zone of inhibition against animal and human pathogen. The study further revealed that the plant posse bioactive compound that elicit antibacterial activity.

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REFERENCES

- [1] Adonizio, A.L., Downum, K, Bennett B.C., Mathee, K. (2006). Anti-quorum sensing activity of medicinal plants, *J Ethanopharmacology*, 105:427-435.
- [2] Anderson, D.P., Jeney,G., (1992). Immunostimulants added to injected *Aeromonas salmonicida* bacterial enhance the defense mechanisms and protection in rainbow trout, *International aquatic Research, Vet Immunol, Immunopathol* 34(3-4):379-389.
- [3] Bauer, A, Kirby,W.M.M., Sherris, T.C.,(1962). Antibiotics susceptibility testing by a single disc method, *Am.J. Clinpathol.*, (45:493).

- [4] Bruno, M, Piozzi F, Maggio, A.M., Simmonds, M.S., (2002). Antifeedant activity of neoclerodane diterpenoids from two Sicilian species of *Scutellaria*, *Chin J integr Med*, (30) 793-799.
- [5] Cai X, Li, Du G, Cao Z, (2008). Protective effects of baicalin on ligature induced periodontitis in rats. *J.periodontol.* 43:14-21.
- [6] Chandrakala N, Ayyavoo M.,(2006). Study on the existence of microbial pathogens on tiger shrimp *Penaeus monodon* (fab) Ph.D thesis submitted to Bharathidasan University, Tiruchirappalli.
- [7] Chen, S.L., Giblert, M.G.,Lix, W. (1994). *Flora of China*, *Scutellaria baicalensis* is a perennial herb, Missouri Botanical Garden press (17), 93.
- [8] Gao, Z., Huang K,Yang X,Xu H,(1999). Free radical scavenging and antioxidant activities of flavonoids the radix of *Scutellaria baicalensis*, *European Journal Of Food Science And Technology*,1472: 643-650.
- [9] Harikrishnan, Balasundram, C, Heo M.S., (2011a). Impact of plant products on innate and adaptive immune system of cultured finfish and shell fish, *International aquatic Research aquaculture*,317:1-15.
- [10] Huang, K.C., 1999). *The pharmacology of Chinese Herbs*, *The journal of alternative and complementary medicine* ,385-386.
- [11] Ikemoto, S, Sugimura K, Yoshida N, Yasumoto R, Wada, S, Yamamoto K, Kishimoto T,(2000). Antitumor effects of *Scutellaria radix* and its components baicalein, baicalin and wogonin on bladder cancer cell lines. *The journal of alternative and complementary medicine.* 55:951-955.
- [12] Jang, E.J., Cha, S.M., Cho, M, Cha, J.D.(2014). Combination effects of baicalein with antibiotics against oral pathogens, *Arch.Oral Biol.* 59:1233-1241.
- [13] Kong, W,Zhao Y,Xiao X (2009). Spectrum effect relationships between ultra performance liquid chromatography, *Anal Chim Acta* 634:279-285.
- [14] Kubo M, Asano T, Shimoto H, Matsuda H, (1994). Studies on *Rehmannia radix*. I. Effect of 50% ethanolic extract from steamed and dried *Rehmannia radix* on hemorheology in arthritic and thrombotic rats, *The journal of alternative and complementary medicine* , (17). 1282-1286.
- [15] Mehendale, S,Auang H,Wang C.Z.,Tong R, Foo A, Xie J.T., (2007). *Scutellaria baicalensis*, attenuate ritonavir-induced gastrointestinal side effects , *J Pharmacol* .59:1567-1572.
- [16] Rao, D.P.C., Satyanarayan, T. (1977). Antibacterial activity of some medicinal plant extract. *Indian Drugs Pharm. Ind.*, 12(3):21-22.
- [17] Sakai (1999). Current research status of fish immunostimulants, *International aquatic Research aquaculture*, 172 (63-92).
- [18] Subasinghe (1997). Fish health and quarantine. In: Review of the state of the world aquaculture FAO fisheries circular No.886. Food and Agriculture Organization of the United nations, Rome, Italy: 45-49.