

**JRK'S YELATHI CHOORNAM TABLET, EFFECTIVE FOR GASTRIC ACID  
NEUTRALIZATION AND INCREASED PROTEIN ABSORPTION**

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**ABSTRACT**

**Introduction:** *Yelathi choornam tablet* is indicated for acid peptic diseases. Acid peptic diseases or acid peptic disorders are the collective term for the collection of diseases that involves acid production in the stomach and nearby parts of the gastrointestinal tract. Pepsin is a major enzyme that plays an important role in the digestion and is active only at lower pH. **Methodology:** Efficacy of *Yelathi choornam tablet* and its influence on pepsin in improving the digestion and absorption was estimated by (1) Pepsin degradation assay by Lowry method. (2) Proteolytic activity of pepsin. **Results:** *Yelathi choornam tablet* did not degrade the pepsin and also showed better proteolytic activity even at high pH. **Discussion and Conclusion:** The present study proves that *Yelathi choornam tablet* is effective in acid peptic diseases and enhance the pepsin activity even at high pH. Details are presented in the paper.

**KEYWORDS:** *Yelathi choornam tablet*, *Eladi choornam*, *Eladi choornam tablet*, Pepsin, Acid peptic diseases.

**INTRODUCTION**

'Acid peptic diseases' is the collective term used to describe various disorders of the gastro intestinal tract due to the high production of hydrochloric acid.<sup>[1]</sup> It includes many conditions such as many gastro-esophageal reflux disease (GERD), gastritis, gastric ulcer, duodenal ulcer, esophageal ulcer, indigestion etc.

Pepsin is the major enzyme involved in the digestion of proteinaceous substances and pepsin plays a significant role in protein digestion. The pepsin is active only at very low pH i.e., between 1-3 and its activity decreases at higher pH (above 7).

The people who suffer from acid peptic diseases will have the mucous layer of the intestine is partly or completely corroded, necrotized and may be infected by microbes. Therefore, protein digestion in such patients is poor. Acid neutralizing drugs may solve the problem of acid peptic diseases but such drugs would seriously impair the protein digestion and absorption. Therefore, a drug that should neutralize the stomach acid and also must protect and preserve the activity of the key enzyme that aids the protein digestion called pepsin so that the protein digestion and its absorption shall remain unhindered even at elevated pH.

*Yelathi choornam* is a time tested siddha/Ayurveda medicine used predominantly for the management of acid peptic disorders.<sup>[2]</sup> *Yelathi choornam* is composed

of seven herbs carefully chosen by the ancient scholars of siddha and Ayurveda through their supernal wisdom.

In the present study, we have established clearly how *Yelathi choornam* protects the characteristics of pepsin and its activity even at elevated pH while neutralizing the gastric acid. Considering the larger scope of *Yelathi choornam* in aiding both protein digestion and absorption even at elevated pH and to neutralize the stomach acid, we have formulated *Yelathi choornam* in tablet dosage form.

The *Yelathi choornam* tablet dosage form effectively preserves the activity of pepsin at alkaline pH as well as it neutralizes the acidic pH to alkaline pH of the stomach acid.

The global scope of *Yelathi choornam* in tablet dosage form in the treatment of acid peptic disorders is explained in detail in the present paper along with how the traditional healing practices can help the medical world to mitigate several health challenges in future.

**MATERIALS AND METHODS**

For all the experiments with Pepsin, the following percentages i.e., 0.5, 1, 2 and 4 of *Yelathi choornam* extract and *Yelathi choornam tablet* were used.

### Pepsin degradation assay by Lowry method

The extent of degradation of pepsin in different pH environment in presence or absence of *Yelathi choornam* was determined. Lowry assay was done to quantify the protein degradation. [1] We used the above method because it is very sensitive and can detect protein as low as 2-5 µg.

In brief, the copper ion is reduced under alkaline condition and is allowed to form a complex with peptide bonds of the protein. This complex is then allowed to reduce with the Folin-Ciocalteu reagent and the final product is read at 650-750nm.

### The preparatory details are as follows.

Preparation of Solution A: This was prepared by dissolving 4 mg/mL of NaOH and 20 mg/mL of Na<sub>2</sub>CO<sub>3</sub> in water.

Preparation of Solution B: 10 mg/mL Potassium Sodium Tartrate and 5 mg/ mL CuSO<sub>4</sub> are dissolved in water and the mixture was stirred well until both salts are completely dissolved.

Then the solution A and B were mixed and stored at 4°C until use.

To 1 % of pepsin solution in distilled water was prepared. To the above the *Yelathi choornam* extract was added in the following concentrations such as 0.5, 1, 2 and 4 mg/ml. Then the mixture was adjusted to varying pH such as 1, 2, 4 and 8. Similarly, Pepsin solution in

various pH without the addition of *Yelathi choornam* extract was maintained as control.

All the above reaction mixtures were incubated for 30 minutes and after 30 minutes of incubation the percentage of pepsin degradation was assayed and compared with the control.

### Proteolytic activity of pepsin

In consonance with the degradation (and or no degradation of pepsin in different pH environment in presence or absence of *Yelathi choornam*) of pepsin, the proteolytic activity of the Pepsin also was studied.

In brief, casein was used as substrate and the end product of the casein hydrolysis-tyrosine was determined. As described above, the pepsin was treated with different concentrations of *Yelathi choornam* extract at different pH and incubated for 30min. After 30 minutes, the filtrate was treated with casein solution and once again the mixture was incubated for 30minutes and after which the mixture was treated with 5% of TCA to remove the un-hydrolyzed casein and the end product of casein hydrolysis –tyrosine was determined spectrophotometrically at 280nm. Standard tyrosine curve was used to calculate the percentage of enzyme activity.

## RESULT

### Effect of pH in Pepsin

Pepsin showed high sensitivity to pH and both the degradation of Pepsin as well as its activity was directly proportional to pH. Table-1.

**Table 1: Effect of pH in Pepsin.**

pH	Pepsin degradation (%)	Proteolytic activity (%)
1	5	48
3	9	44
5	45	19
8	60	9

### Pepsin degradation in presence of *Yelathi choornam* extract

*Yelathi choornam* extract was found to prevent the pepsin degradation significantly despite the possible

impact of higher pH and the extent of degradation of pepsin in *Yelathi choornam* extract was much lower than the pepsin in different pH environment. Table 2.

**Table 2: Pepsin degradation in presence of *Yelathi choornam* extract.**

S. No.	Treatment	Concentration of yelathi (%)	Pepsin degradation / pH			
			1	3	5	8
1	1% Pepsin + <i>Yelathi choornam</i> extract	0.5	13	14	25	63
2		1	10	12	35	72
3		2	6	8	46	84
4		4	5	7	58	91

### Pepsin degradation in *Yelathi choornam* tablet

*Yelathi choornam* tablet significantly retarded pepsin degradation even at high pH. Table- 3.

**Table-3: Pepsin degradation in *Yelathi choornam* tablet.**

S.No	Treatment	Concentration of yelathi (%)	Pepsin degradation / pH			
			1	3	5	8
1	1% Pepsin + Yelathi	0.5	11	13	15	19
2		1	9	11	13	18
3		2	8	9	11	16
4		4	7	8	7	12

**Effect of *Yelathi choornam* extract on Proteolytic activity of pepsin**

Although yelathi choornam extract has shown a positive effect on the proteolytic activity of pepsin in a

concentration dependent manner but at higher pH the activity of pepsin was found to decline despite the presence of Yelathi choornam extract. Table 4.

**Table-4: Effect of *Yelathi choornam* extract on Proteolytic activity of pepsin.**

S. No.	Treatment	Concentration of Yelathi (%)	% of Tyrosine (Casein Hydrolysis) / pH			
			1	3	5	8
1	1% Pepsin + Yelathi choornam tablet	0.5	62	58	15	14
2		1	71	69	19	16
3		2	78	74	24	21
4		4	86	80	28	23

**Effect of *Yelathi choornam* tablet on Proteolytic activity of pepsin**

Yelathi choornam in tablet dosage form has significantly increased the proteolytic activity of pepsin in a

concentration dependent manner and further the enzymatic activity of pepsin remained stable even at higher pH when Yelathi choornam tablet dosage form was used. Table 5.

**Table-5: Effect of *Yelathi choornam* tablet on Proteolytic activity of pepsin.**

S. No.	Treatment	Concentration of Yelathi (%)	% of Tyrosine (Casein Hydrolysis) / pH			
			1	3	5	8
1	1% Pepsin + Yelathi choornam tablet	0.5	65	59	55	45
2		1	72	76	62	48
3		2	81	79	66	51
4		4	88	86	68	55

**Effect of tablet base on Pepsin**

The base used for formulating *Yelathi choornam* tablet did not affect the enzymatic activity of pepsin either positively or negatively. Table 6

*Helicobacter pylori* infection also forms another necessary step in the treatment.

**Table-6: Effect of tablet base on Pepsin.**

pH	Proteolytic activity (%)
1	46
3	42
5	16
8	7

In the present study we have established that *Yelathi choornam* one of the ancient siddha wonderment has significantly increases the enzymatic activity of pepsin. Pepsin plays a significant role in protein digestion and assimilation. Pepsin is active only at acidic pH and its activity seriously impairs at alkaline pH.<sup>[4]</sup>

**DISCUSSION**

Our present investigation has brought out an unknown facet of traditional healing practices of India and how ancient siddha drugs can offer solution to several mind boggling medical conditions in future. The conventional line of treatment for acid peptic disorders includes the list of drugs that would prevent the production of acid or reduce or would neutralize the same. Healing the mucous membrane that is corroded by the acid is also another line of treatment. The anti-microbial activity against

*Yelathi choornam* is given for the treatment of acid peptic disorders since time immemorial and several AYUSH healers have rated the efficacy of *Yelathi choornam* to be superior over many other medicaments for the same<sup>[3]</sup>. Since *Yelathi choornam* contains several volatile/essential oils emitting herbal ingredients we have decided to evaluate the possible mechanism of action of *Yelathi choornam* for acid peptic disorders.<sup>[5]</sup>

Our study has established that *Yelathi choornam* significantly increases the activity of pepsin and thus may aid in increased protein digestion. Increased protein digestion may directly benefit the wound healing aspect of mucous membrane because proteins are largely

considered as body builders. Further the protein also may bind to the essential oils and thereby may augur the anti-microbial benefit of the essential oils in *Yelathi choornam*. After seeing the scientific enormity of *Yelathi choornam* and its effect in accelerating protein digestion we have decided to enhance the enzymatic activity of pepsin through *Yelathi choornam* by reformulating the same. For the above purpose we have decided to formulate *Yelathi choornam* in tablet dosage form with appropriate pH modifiers to elevate the pH of the gastric juice from acidic to alkaline. But our aim posed a big challenge to us as how pepsin activity can be achieved at superior level when we attempt to neutralize the gastric fluid from acidic to alkaline pH.

To our surprise we found that *Yelathi choornam* has increased the enzymatic activity of pepsin even at higher pH which was not known to the scientific world until we establish. Since the *Yelathi choornam* has activity to boost the protein digestion by increasing the pepsin activity even at higher pH we presumed that formulating *Yelathi choornam* as tablet form with the incorporation of base with pH modification will form an important part in the management of the disease. When we evaluated the efficacy of *Yelathi choornam* and *Yelathi choornam* in tablet form we found that *Yelathi choornam* in tablet form not only offered protection to pepsin from neutralization and higher pH but also preserved and increased the enzymatic activity of pepsin.<sup>[4]</sup>

Our findings clearly show that *Yelathi choornam* in tablet form offers the dual benefits of increased pepsin activity and complete protection of pepsin at elevated pH. The above benefits may result in increased protein digestion and healing per se of wounds as well as acid neutralization.

In our earlier study, we have established the weak anti-microbial activity of *Yelathi choornam* extract on *H.pylori* (data on file). *H.pylori* being an acidophilic organism, a significant alteration in the pH ecosystem of the organism along with even a weak anti-microbial activity may be sufficient to bring down or minimize the infection rate of *H.pylori* in gastric epithelium.

*Yelathi choornam* in tablet dosage form achieves all the essential treatment requirements for acid peptic disorders such as increased protein absorption, pH neutralization, healing the wounds and act against the principle causative agent of gastric infection *H.pylori*.

Our present study has also opened a new vista of hope that most of the traditional drugs if reformulated in accordance in modern day science may offer wonderful therapeutic benefit against variety of diseases and the associated clinical manifestations.

In the light of the present investigation we suggest that the medical fraternity may choose *Yelathi choornam* in tablet dosage form than *Yelathi choornam* because the

tablet dosage form offers multitudes of benefits than the *choornam*. We hope in near future the *Yelathi choornam* tablet dosage form may revolutionize the treatment of acid peptic disorders.

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