

## STUDIES ON ANCIENT INDIAN CONCEPT OF 'ROLE OF IMPAIRED GASTRO – INTESTINAL FUNCTION – ENTEROPATHY', IN THE PATHOGENESIS AND TREATMENT OF RHEUMATOID ARTHRITIS - AMAVATA

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**ABSTRACT:** *In this paper an attempt has been made to evaluate the theory of Ayurveda on rheumatoid arthritis, in relation to the modern medical concept. The evolution of the disease, its etiopathogenesis, its pathological, biochemical as well as therapeutic data published in support of this concept and finally the details of clinical trial of Sunthi in treating 265 patients are dealt with.*

The rheumatic diseases especially rheumatoid arthritis have been causing immense suffering to the people throughout the world. This state of affairs has been mainly due to lack of proper understanding of the disease process. Intensive studies have put-forth several concepts of its etiopathogenesis. Out of these the definite role of genetics and immunity has been established (Kishore 1965). The exact mechanism and the beginning of the process is not still understood. As such, efforts are being continued to study the etiopathogenesis of the disease. In this context the ancient Indian concept of role of impaired gastrointestinal function (enteropathy) has also been taken up for investigation more than two decades ago (Kishore 1965). It is interesting to note that the modern scientific workers in other parts of the world have also putforth certain similar theories of its causation (Shat in 1964). An attempt has been made in this paper to evaluate the theory of ancient Indian medicine – Ayurveda, in relation to the modern medical concept. These may be

broadly grouped into three. The first dealing with the evolution of the disease, its etiopathogenesis, the second diseases, the pathological, Biochemical as well as therapeutic data published in support of this concept and finally the details of trials of *Sunthi* in series of 4 trials consisting of 265 patients.

### **Evolution:**

The antiquity of this disease may be traced from the very beginning of the civilization on the basis of findings on ancient Egyptian mummies. Though its description in medical sciences was initiated by Hippocrates (6<sup>th</sup> century B. C.) the first clinical description of this disease was only put forth by Arteus (100 A D). The term “Rheumatis” was coined by Galen (199 A.D.) who also specified the “Arthritis” to indicate joint disease. Further developments in understanding this disease could take place only after more than 1400 years, in the 17<sup>th</sup> century further developments in understanding this could take place with the

identification of Gout from Rheumatism by de Baileu which was followed by further classification of Rheumatis into acute and chronic varieties (Sydenham 1629 – 89 A. D.) the proper clinical description and present nomenclature was put forth only in the middle of last century. Certain concepts of etiology indicating its neurogenic and infective origin were also proposed during this century. The intensive studies on sedimentation rate, hypersensitivity/auto immunity and demonstration of “Rheumatoid factor” and its practice / such as the introduction of therapeutic criteria and functional tests in the evaluation of the effect of the treatment, practice of gold salt cortisone and ACTH therapy are some of the important achievements during the first half of this century. Later, detailed studies on the diagnostic significance of rheumatoid factor contributed to development of more serological tests. Since the problem of suitable diagnosis has still remained unsolved, the ARA developed certain criteria, on the basis of serological, radiological, biochemical, pathological and clinical findings on this disease. Certain new therapeutic agents such as, Phenylbutozone, anti-malarials and indomethacin were also introduced simultaneously. The term intestinal arthritis was introduced subsequently along with the role of enteropathy in the etiopathogenesis and management of this disease.

On the other hand, the description of this disease in Ayurveda dates back about 1000 B.C. In the earlier period the joint diseases were discussed mainly under the title ‘Vatarakta’. The etiological factor i.e. ‘Ama’ was said to produce various diseases in combination of various *Dosas* and *Dusyas* of the body. The same trend continued up to 6<sup>th</sup> century A. D. where in the description of manifestations of *Ama* was given and the

diseases occurring due to *Ama* were termed as *Sama*.

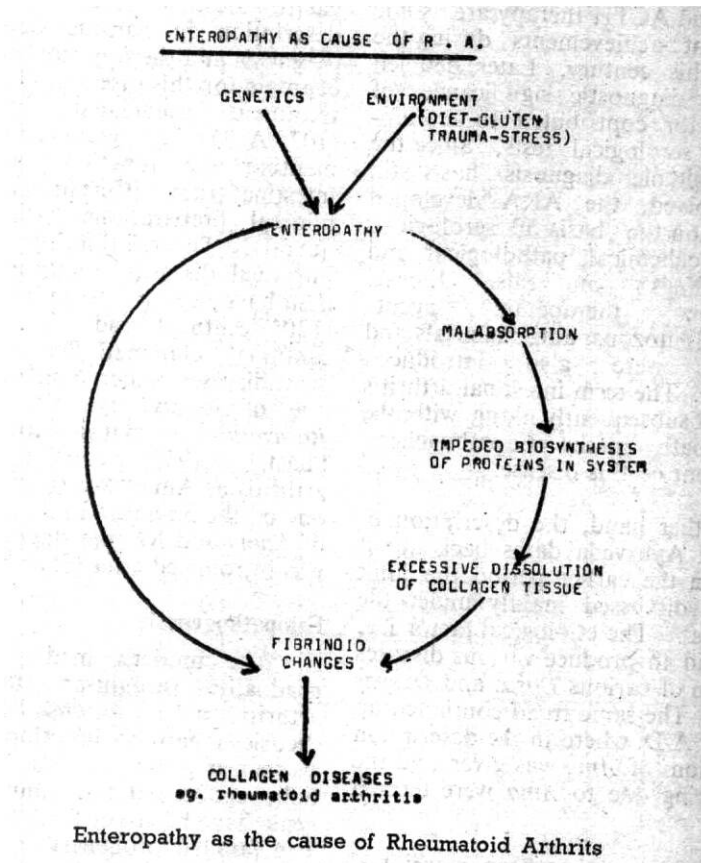
The terms *Amavata* has been mentioned in *Charaka Samhita*, which may date back to 1000 B.C., possibly to denote the relation of *Ama* with *Vata* as discussed earlier. The *Madhava Nidana* (900 A.D) though compiled as an abstract treatise on clinical diagnosis, has included several new diseases. Among these the diseases *Amavata* deals in detail the etiopathogenesis and manifestations of a disease entity in addition to the joint disease mentioned earlier, whose clinical manifestations are very much similar to Rheumatoid Arthritis. The basic etiological factor in this disease has been considered as impaired gastro – intestinal function. The clinical features of the disease may be grouped broadly into three categories. The general ones and those relating to pain and swelling of the joints and the sequelae or complications. In all these aspects the symptoms largely reflect the inflammatory swelling of the joints and disturbed / impaired gastro – intestinal function. Following this description in various books on clinical diagnosis and therapy have devoted separate chapters for this disease. The principles of treatment enunciated by *Chakradutta* (1075 A. D.) lays great emphasis on augmenting the functions of the gastro intestinal tract. Certain herbal and herbomineral preparations were added subsequently. The relationship between gastro intestinal diseases *Amatisara* and *Grahanidosa* have been put forth by *Harita Samhita* (12<sup>th</sup> century) and *Yogaratanakara* (17<sup>th</sup> century). Gananath Sen (1943) discussed joint diseases under *Sandhivata Nidana* and on of its five varieties was termed as *Rasavata* – rheumatoid arthritis. Sudarsan Shastri (1953) considered rheumatoid arthritis as *Amavata* and rheumatic fever as one of the *Sanipatika Jwara*. The concept of *Sama*

and *Nirama* stages in its treatment was introduced later (Shasri 1961).

### Etiopathogenesis

The modern medical sciences have gradually recognized the Rheumatoid arthritis as a systemic disease. Various theories regarding its etiopathogenesis such as neurogenic, vascular, infective, metabolic, endocrinal, auto-immune and psychogenic have been put forth from time to time. The familial proneness to this disease has clinched the important role of genetics in the etiopathogenesis of this disease. Presently it is being considered as

an auto immune disorder though endocrine, metabolic and infection factors are not completely ruled out. In addition, a new proposition assigning crucial role of enteropathy has also been put forth. The pathogenesis of this disease according to this concept revolves round the inherent susceptibility to enteropathy which can be activated by diet (gluten), trauma, infection and drugs acting on small intestine. This enteropathy leads to the malaabsorption and impeded biosynthesis of protein resulting in excessive dissolution of collagen tissues. This process causes further damage to the intestine (Fig. I).



With the perusal of Ayurvedic literature it is evident that there is ample emphasis, on the gastro – intestinal disturbances as the primary cause of rheumatoid arthritis (*Amavata*). Hypo functioning of digestive

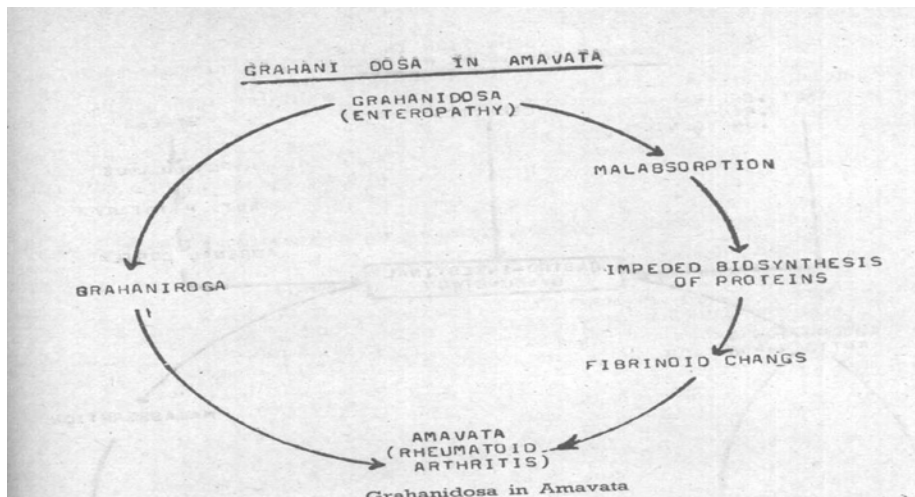
mechanism as a whole is the sheet anchor which leads to incomplete processing of food. An interesting theory has been advanced that some component of this incompletely proceed food – *Ama* is

absorbed in the system and is capable to produce vascular and tissue changes (*Srotobhishyanda*). The involvement of *Shleshaka Kapha* in the pathogenesis of *Amavata* has got great resemblance with that of connective tissue disorder. The observation of Yoga Ratnakara in this reference about *Grahani Dosa* is also very pertinent. The concept of *Grahani Dosa* is analogous to enteropathy, usually it initiates *Grahani Roga* (colic disease) but its relation with *Amavata* (Rheumatoid Arthritis) is another aspect of its clinical manifestation (Fig. 2).

Thus the thought in the Indigenous system of medicine in connection with the causation of rheumatoid arthritis, is very much similar with the school of today considering gastro-intestinal disorders to be primary; however, a few novelties are also there. Shatin has explained the initiation of vascular and tissue changes in the target organs to be a passive phenomenon following hypoproteinemia as the result of malabsorption. On the other hand Ayurveda believes it to be an active phenomenon. *Ama* – component of incompletely processed food reacts and interacts with the humours and cells of the body and finally initiates the vascular and tissue changes in the target organs.

According to them various psychological, dietary and other factors only operate through the gastro-intestinal system leading to hypo functioning of digestive mechanism. The role of *Ama* has a great resemblance with the theory of altered immune mechanism (Tripathy, Shukla and Kishore, 1965). Allergic manifestations with the absorption of denatured proteins from the intestinal tract is a known example of such a possibility. The exacerbation in the gastro-intestinal symptoms during active phase of the disease may also be explained with this hypothesis.

In short according to Ayurveda the various etiological factors operate through the gastro-intestinal axis, leading to its hypo functioning and further damages. Further the incompletely processed food *Ama* - (having antigenic property) produces the disease following multiple changes in the body. Thus the concepts of gastro – intestinal disorder specially enteropathy and altered immune mechanisms are interwoven together in this theory. No doubt hypo – proteinemia, the result of enteropathy produces susceptibility to fibrinoid change, which may be precipitated by the action of *Ama* (Fig. 3).



## Observation on Gastro – Intestinal Disfunction / Impairment

Gastro – intestinal disfunction has been considered to be the cause of all diseases in Ayurveda. Its role in various disease is explicitly discussed. As already mentioned this concept has been very much emphasized in the etiopathogenesis of *Amavata* – rheumatoid arthritis. The observation of clinical manifestations indicating gastro – intestinal disfunction such as anorexia, loss of appetite, constipation or diarrhoea have also been discussed in the text books of modern medicine. (Traut 1952, Duthie 1964). In addition certain conditions like non specific ulcerative colitis and regional enteritis have also been reported to be

associated with the causation, exacerbation and remission of rheumatoid arthritis. Certain studies have also indicated comparatively higher incidences of gastro – intestinal diseases in the patients of rheumatoid arthritis than the diseases of other system (Gibberd 1965).

The biochemical and histopathological observations on stomach, liver and small intestine have also been reported from various countries, (Table – I) also definitely indicated impairment of function of these organs.

**TABLE – I**

### Showing observation on impaired gastro – intestinal function

A. Stomach	Gaspordy & Vida (1964)	Gastric acid showed 48% anacid and 25% subacid in 200 patients of RA
	Kirshore P. (1966)	Gastric acid – Achlor in 5 cases and hypo in 5 cases among 28 cases of RA
	Pelika V. et al (1962)	Histologically changes in gastric mucosa leading to atrophic gastritis
B. Liver	Morace G et al (1964)	Among 18 patients studies Thymol turbidity was pathologically increased in 15 (83%) cases, serum prothrombin level decreased in 11 (71%) cases and B.S.C test was abnormal in 15 (83%) cases.
	Panerai A et al (1964)	Liver biopsies on 18 cases of RA showed infiltration, presence of mononuclear cells, proliferation of Kupfer's cells and fatty degeneration.
	Castenfors E et al (1964)	BSP test was abnormal in 21 cases out of 22 cases of RA
	Kishore P. (1964)	Thymol turbidity raised in more than

C. Small intestine	Sievers K et al (1964)	80% of cases, alkaline phosphatase raised in more than 50% of cases.
	Kishore P (1964)	Parenchymal liver damage.
	Tripathy S. N. et al (1979)	Intestinal absorption – d – xylose below normal in more than 40% cases, radio-iodinated human serum albumin absorption test indicates subnormal value in 2/3 <sup>rd</sup> of patients.
	Sharma et al (1981)	d – xylose absorption below normal.
	Tewari C met al (1979)	d – xylose absorption below normal. d - xylose below normal in all cases (10). Thyroid function lowered, shortening broadening and infiltration of the villi of the Jejunum.

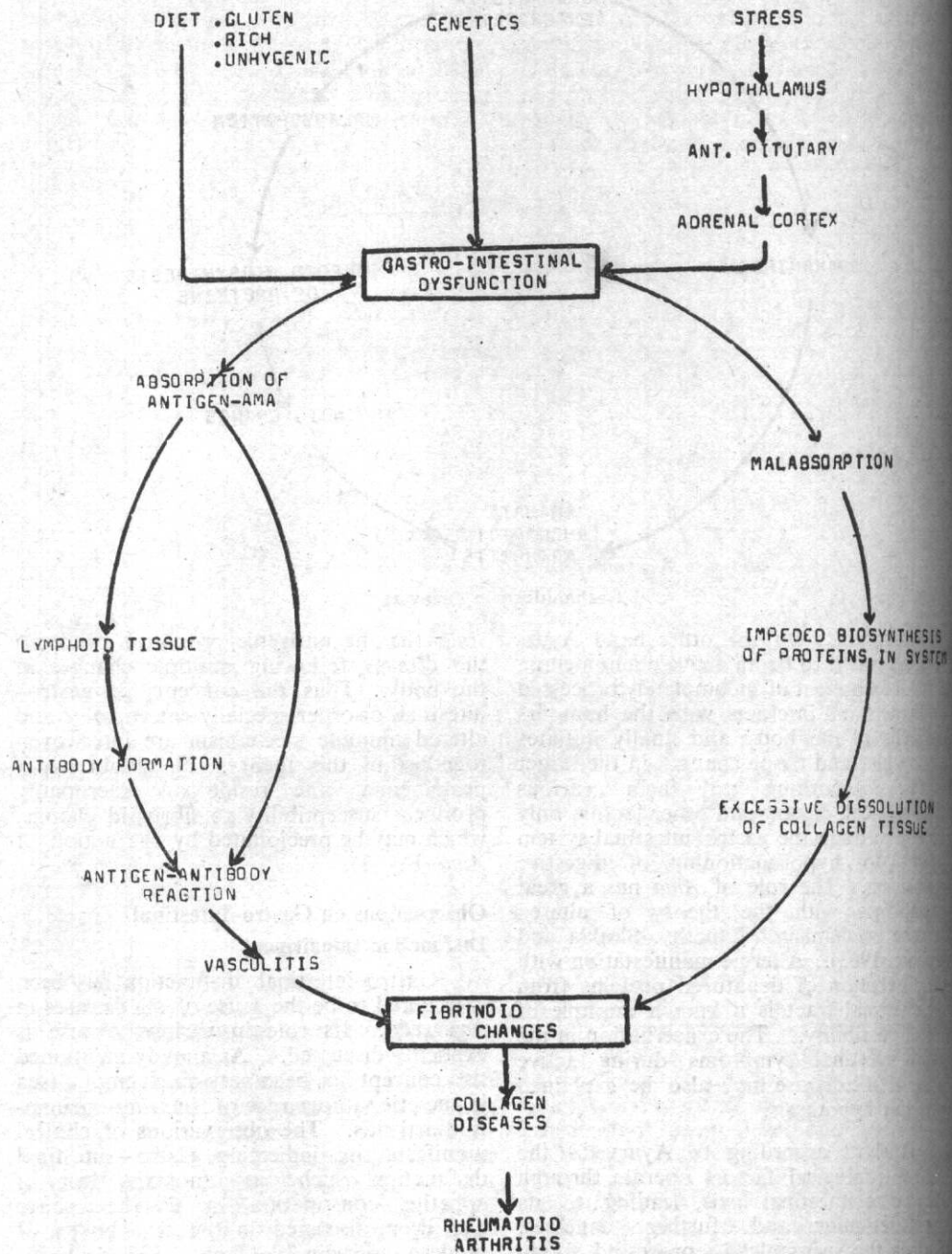
### Clinical trial of sunthi preparation

In order to study the effect of gastro-intestinal stimulant drugs in the treatment of rheumatoid arthritis the present series of trials of *Sunthi* preparations have been taken up. The drug *Sunthi* –Zingiber officinal (dry) has been selected for trial since this has been extensively recommended as a single drug in simple combinations as well as in most of the compound formulations recommended in Ayurveda for the treatment of this disease. The pharmacodynamic properties of *Sunthi* are opposite to the properties of *Rasa*, *Kapha* and *Ama*, which are bodily factors (Dosa – Dushyas involved in the etiopathogenesis of this disease. This drug has also shown therapeutic efficacy in the patients of *Grahaniroga* (enteropathy,

M. A. S.) (Dixit et al 1977) which has been said to be the basic pathology in the patients of *Amavaa* as well.

The combinations for the trial, *Sunthi* – *Guduchi*, *Sunthi* – *Guggulu* and *Rasonadi Kvatha* (*Rasona* – *Sunthi* – *Nirgundi*) have been selected on the basis of their classical description as well as published data supporting their efficacy in the treatment of this disease. In order to have the idea of its comparative efficacy a standard set of Ayurvedic preparation consisting of *Yogaraj Guggulu*, *Vatagajankusha Rasa / Amavatrai Rasa*, *Maharasnadi Kvatha* has also been prescribed to control group of cases.

G . I . DYSFUNCTION IN THE PATHOGENESIS OF R . A .



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## Materials and Methods

The patients for trials were selected on the basis of ARA criteria (1959) and only clinical findings as morning stiffness, pain in motion, swelling of one joint, swelling of another joint, symmetrical involvement of joints sub-cutaneous nodules over bony prominences along with radiological reports were taken into account. After admission the patients were subjected to detailed clinical examinations pertaining availability of relevant findings, their intensity as well as certain functional tests and measurement of joints. A specific proforma evolved was filled up for each patient. In some cases photographs of the affected joints were also taken.

The following treatments in four separate trials were given groupwise as follows (Table 2).

In addition to the above medicines, Baluka Sveda and Lepa were given in the acute stage of the disease.

## Assessment and Classification of Results.

The assessment of the results has been done according to the changes in clinical findings. In addition, the changes in ESR test, functional tests and measurement of the joints have been noted. The results of the treatment have been classified as follows:

*Complete relief:* Completely free from signs / symptoms of joints inflammation with free movement of the joints except those due to irreversible changes.

*Partial relief:* Reduction of signs / symptoms of the joint inflammation and improvement of joint movement to a major extent, but not fully.

*No relief:* No response at all or only marginal improvement of the condition.

*Drop out:* The patients who discontinued the treatment before stipulated period.

TABLE – II

Trial No. 1	A. Yogaraj Guggulu – 1 gm Vatagajankusa Rasa – 250 mg. Maharasanadi Kvatha – 50 ml.	Thrice daily	40 patients
	B. Sunthi – Guduci Kvatha 25 ml. – 50 ml.	Thrice daily	37 patients
Trial No. 2	A. Sunthi – Guggulu – 2 gms	Thrice daily	36 patients
	B. Yogaraja Guggulu – 2 gms Amavatari Rasa – ½ gm Maharasanadi Kvatha – 25 ml.	Thrice daily	27 patients
Trial No. 3	Rasanadi Kvatha – 25 ml.	Thrice daily	50 patients
Trial No. 4	Sunthi – Guggulu – 2gms	Thrice daily	75 patients



## Observations

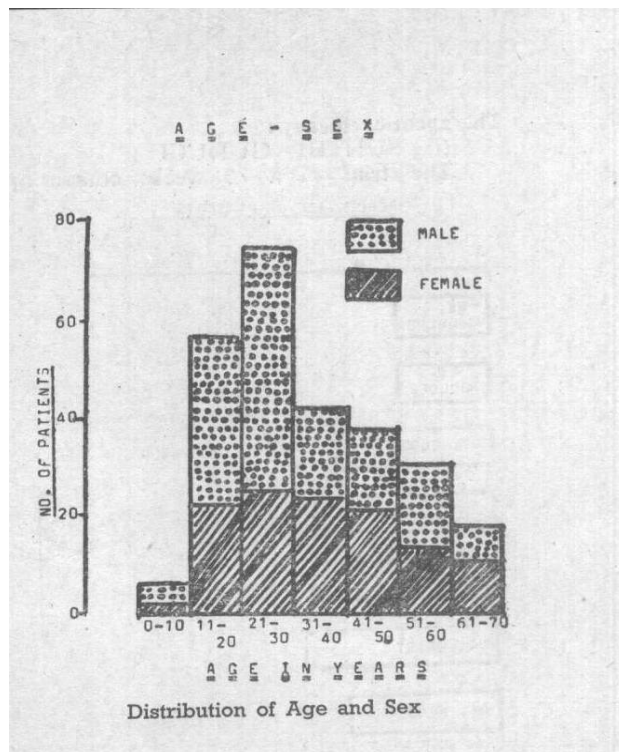
The observations on 265 patients in four separate trials have been taken up for a period of more than six years to assess the role of *Sunthi* and certain other drugs in the treatment of rheumatoid arthritis. The observations on the general clinical profile of patients have been discussed first and the effect of each combination of *Sunthi* in different trials have been discussed separately.

### The general clinical profile

The observations indicated that the disease affects the individuals of either sex in all age groups, though the incidence appears to be maximum in the age group of 21 – 30 years (Table – III), (Figure – 4).

The patients have been suffering with the disease mostly from less than one year duration, though many chronic patients

suffering for the duration of more than 10 years were also observed. The knee joints, ankle joints and wrist joints were most commonly affected (Figure – 5). Certain patients, where X- ray of joints were taken, showed varying degree of changes ranging from Osteoporosis to Anklyosis and fusion of bones. The overall classification of cases taken up for trial as per the ARA criteria has been observed as either “Definite or Classical”. The joint involvement are invariably poly – articular and symmetrical. The ESR has been found to be raised in most of the patients. Though most of the patients were having Gastro – intestinal symptoms such as constipation, loss of appetite etc. certain patients with chronic diarrhoea were also observed. It was also noted that the intensity of the disease was directly related to the intensity of the diarrhoea.



**TABLE – III**

**Showing the age and sex**

Sex	Age in years							Total
	1 – 10	11 – 20	21 – 30	31 – 40	41 – 50	51 – 60	61 and above	
Male	4	34	49	18	16	17	7	145
Female	2	22	25	24	22	14	11	120
<b>Total</b>	<b>6</b>	<b>56</b>	<b>74</b>	<b>42</b>	<b>38</b>	<b>31</b>	<b>18</b>	<b>265</b>

**Therapeutic efficacy:**

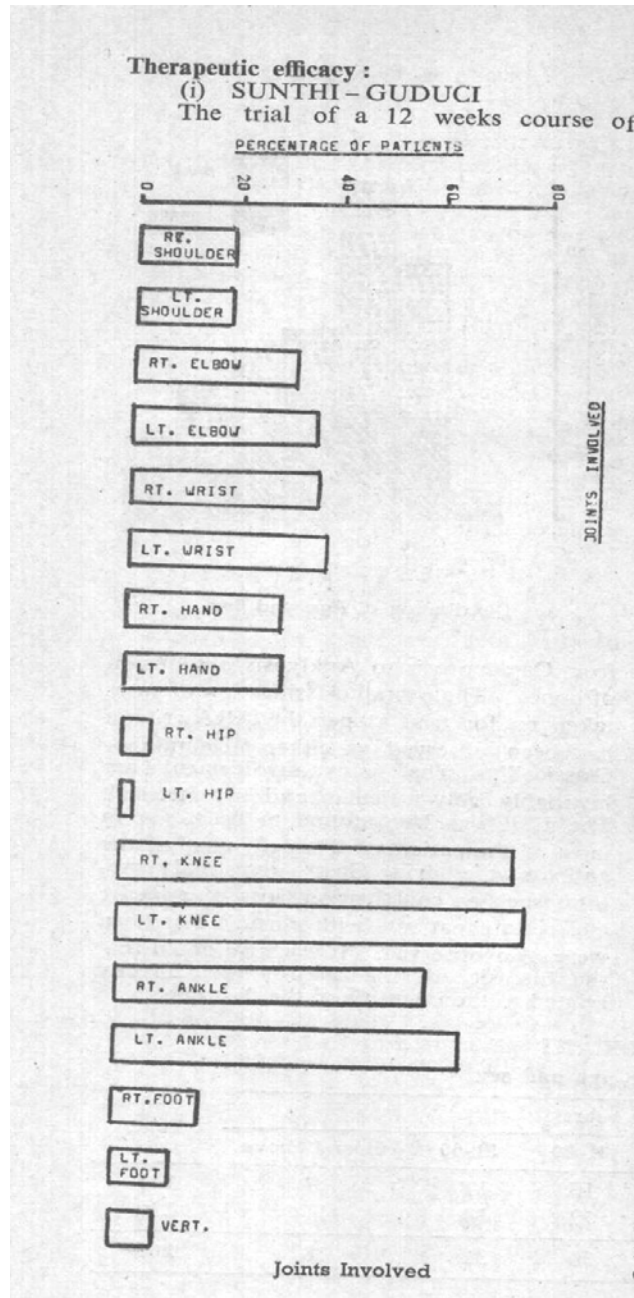
(i) SUNTHI – GUDUCI

The trial of a 12 weeks course of Sunthi – Guduci in the form of decoction in the dose of 25 – 50 ml. three times a day, in comparison to a combination of *Yogaraja Guggulu*, *Vaagajankusa Rasa* and *Maharasnadi Kvatha* has been taken up in 77 patients in two groups. The treatment gradually showed improvement in the pain, swelling and restriction of movement, the cardinal manifestation of the disease in both the groups of treatment. The effect of *Sunthi – Guduchi* has been relatively better since the percentage of patients with no relief and drop out has been much less than the other set of the treatment and many more patients have been reported partial Relief (Table – 4), (Figure – 5).

The ESR have also shown significant reduction in the patients treated with *Sunthi – Guduci* and in most of the cases it has come within normal limits after treatment.

(ii) SUNTHI – GUGGULU (A)

A clinical trial of *Sunthi – Guggulu* in comparison to *Yogaraja Guggulu*, *Amavatari Rasa* and *Maharasnadi Kvatha* has been taken up on 63 patients in two groups. 36 patients were treated with a six week course of *Sunthi – Guggulu* in the dose of 2 gms. Three times a day whereas the 2<sup>nd</sup> group of 27 patients were treated with the other combination mentioned above. Remarkable improvement was observed within a short period of treatment with *Sunthi – Guggulu* and the percentage of patients who reported complete relief and partial relief have been much more with the treatment by *Sunthi – Guggulu* than the other combination mentioned above (Table – 5), (Figure – 7).



(iii) SUNTHI – GUGGULU (B)

Keeping in view the better efficacy of *Sunthi* – *Guggulu* combination, efforts have been made to further assess its effect in a larger series of patients. As such the trial of a six week course of *Sunthi* – *Guggulu* alongwith local external treatments have been taken up on 75 patients. The effect of the drugs have been quite significant and it has been observed that almost all the cases who have

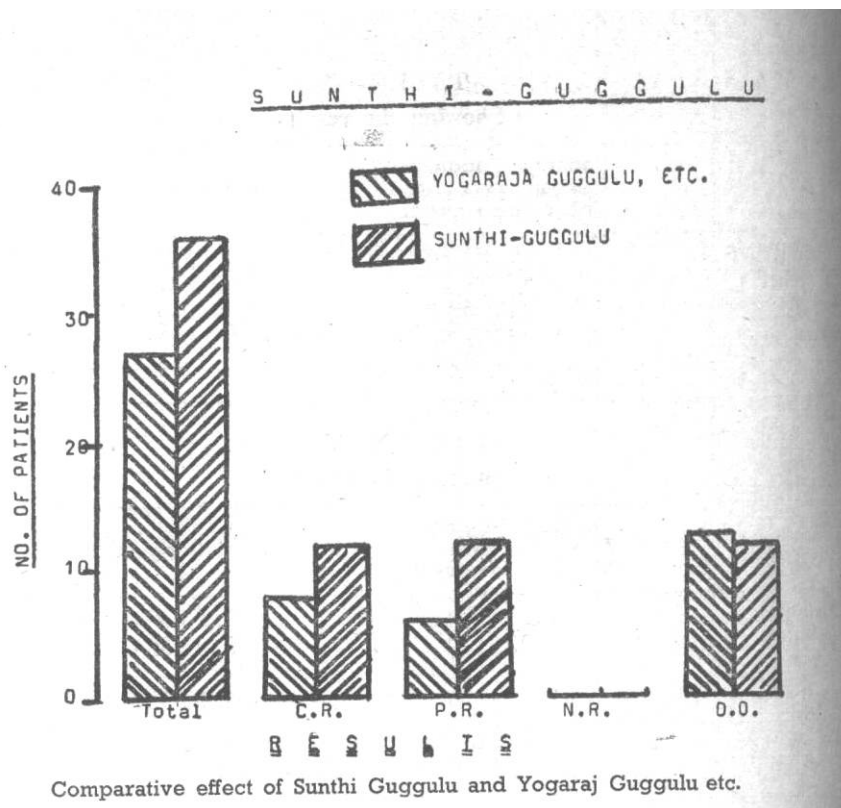
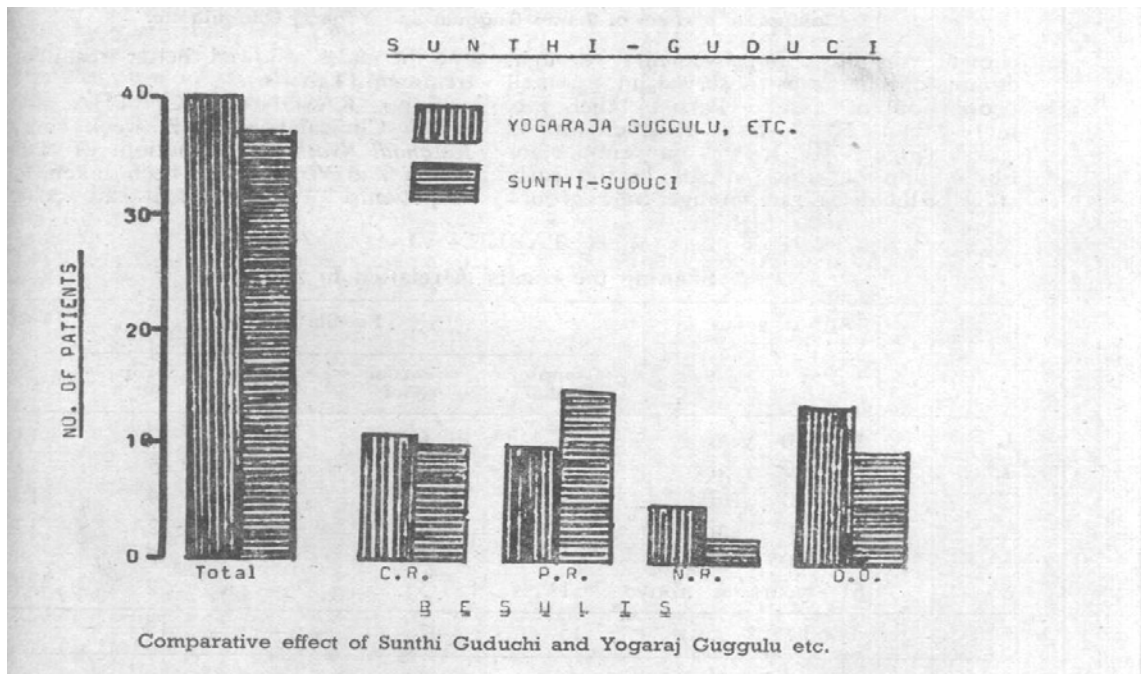
completed the course have shown definite improvement though, complete relief was observed in a small proportion of cases. Partial relief i.e. more than 50% were observed in 42 cases (Figure – 8). It was an important observation that the patients in the early stage of diseases in younger age groups and the males showed better result of the treatment (Table – 6).

**TABLE – IV****Showing the results**

<b>Results</b>	<b>Yogaraja Guggulu Vatagajankusa Rasa Maharasanadi Kvatha</b>	<b>Sunthi – Guduci</b>	<b>Total</b>
Complete Relief	11 (27.5%)	10 (27.2%)	21 (21.2%)
Partial Relief	10 (25%)	15 (40.54%)	25 (32.46%)
No Relief	5 (12.5%)	2 (5.40%)	7 (9.9%)
Drop Out	14 (35%)	10 (27.02%)	24 (31.16%)
<b>Total</b>	<b>40</b>	<b>37</b>	<b>77</b>

**TABLE – V****Showing the results**

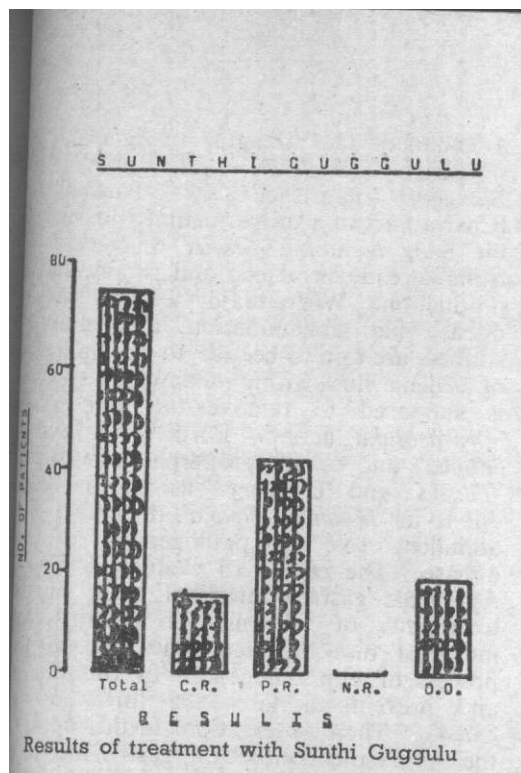
<b>Results</b>	<b>Yogaraja Guggulu Amavatari Rasa Maharasanadi Kvatha</b>	<b>Sunthi – Guduci</b>	<b>Total</b>
Complete Relief	8 (27.62%)	12 (33.3%)	20 (31.74%)
Partial Relief	6 (22.22%)	12 (33.3%)	18(28.57%)
No Relief	--	--	-
Drop Out	13 (48.14%)	12 (33.3%)	25 (39.68%)
<b>Total</b>	<b>27</b>	<b>36</b>	<b>63</b>



(iv) RASONADI KVATHA

A Clinical trial of six week course of *Rasanadi Kvatha* combination of *Rasana*, *Sunthi* and *Nirgundi* has been taken up on 50 patients. The treatment showed good effect since most of the patients who completed

full course of treatment showed definite improvement – 28% Complete relief and 46% Partial relief. It was observed that the drug was more effective in female patients (Table – 7), (Figure – 9).



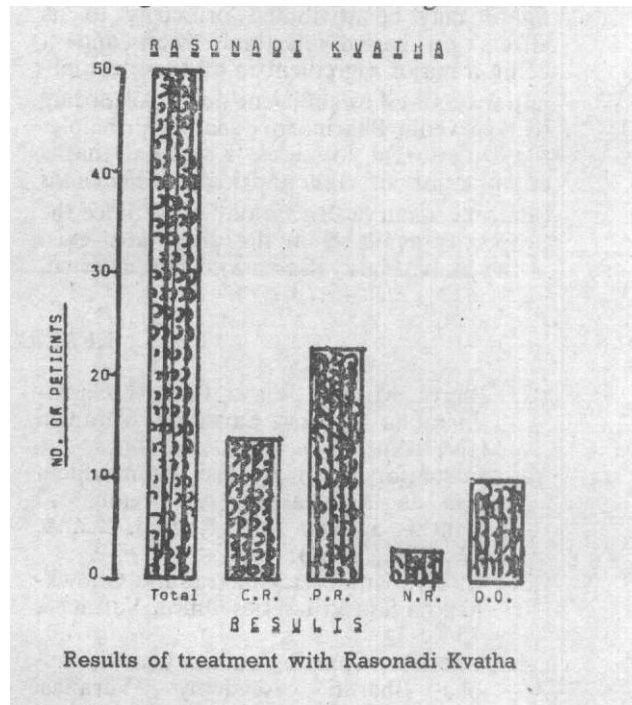
**TABLE VII**  
Showing the Results

S.No.	Results	Male	Female	Total
1	Complete Relief	5 (19.23%)	9 (37.5%)	14
2	Partial Relief	12 (46.1%)	11 (45.83%)	23
3	No Relief	2 (7.69%)	1 (4.16%)	3
4	Drop Out	7 (26.92%)	3 (12.5%)	10
<b>Total</b>		<b>26</b>	<b>24</b>	<b>50</b>

## DISCUSSION

The impaired gastro – intestinal function has been said to play the crucial role in the etiopathogenesis of Rheumatoid arthritis in Ayurveda. As already mentioned, this view has been further substantiated by the observations on gastro – intestinal functions such as acid secretion from stomach, liver function and intestinal absorption and histopathological studies on the mucosa of

small intestine. The therapeutic observations on *Bhallataka* preparations have also further confirmed this view (Kishore 1965, Tripathy et al 1979, Sharma et al 1981). Similar view on gastro – intestinal disfunction – entropathy has also been assigned etiological role by some modern scientific workers in recent past.



In view of the Ayurvedic concept of Gastro – intestinal etiology of this disease an attempt has been made to assess the effect of *Sunthi* in the treatment of this disease. This drug has been said to regulate the bowel movement by way of controlling loose and watery motion as well as relieving constipation. The digestive / stimulant action of the drug has been well established. Thus, this drug will be able to alleviate the 'Ama' the chief causative agent of the disease according to Ayurveda. This concept has been put to test on a series of four trials with the various combinations of

*Sunthi* as a major ingredient. The effect of its combination has been better than that of the prevent Ayurvedic preparations such as *Yogaraja Guggulu*, *Vatagajangusa Rasa*, *Amavatari Rasa* and *Maharasandi Kvatha*. The effect of the combination of *Sunthi* may be attributed primarily to its effects on gastro-intestinal tract, and it being a major ingredient in all these combinations as well as sufficient dose. According to Ayurvedic Pharmacodynamic principles the drug *Sunthi* possesses 'Katurasa' that is combination of *Agni* and *Vayu Mahabhutas* (Sharma Acarya Priyavrata – 1976) since the

properties available in the drugs also exist in the human body (Susruta), when ingested, it enhances the strength of *Agni* due to similarity. So the '*Dhatvagnis*' and '*Bhutagnsi*' nourished by Panchakagni (Charak) act in a proper manner throughout the body including '*Srotas*' to convert the '*Ama*' already produced and to prevent its production. When major features of this disease like inflammation and morning stiffness are said to be due to accumulation of oedema fluid within inflamed tissues, it is supposed to remove this due to its '*Dravastosaka*' action. Further it alleviates

'*Kapha*' due to its properties like '*Usna*' '*Tiksna*', and '*Usnavirya*' as well as '*Vata*' due to its '*Madhura Vipaka*', these two take dominant role in pathogenesis of this disease. The efforts to evaluate a potent Ayurvedic gastro – intestinal drug in the treatment of rheumatoid arthritis has indicated that the treatment acts on the process of etiopathogenesis of this disease and prevents / alleviates the formation of '*Ama*'. These observations further confirm the Ayurvedic concept of gastro – intestinal origin of the disease by providing further therapeutic evidence.

## REFERENCES

1. Bhava Mishra, Bhava Prakash Chowkhambha Sanskrit Sansthan Varanasi (INDIA).
2. Castenfors E. et al, The Bromsulfein test as a measure of rheumatoid arthritis activity Act : Rheum. Scand. 10 : 128 (1964).
3. Chakrapandidutta, Chakradutta Chowkhamba Sanskrit Series Office, Varanasi, 1961.
4. Charaka, Charak Samhita Chowkhambha Bharathi Academy Varanasi (India), (1980).
5. Dixit Sk. Et al, Role of Shunthi in the treatment of Grahaniroga – Clinical studies on Grahani Dosh – I, JRIMY & H, Vol. XII, No.4, P – 112 – 113. (1977).
6. Duthie J. J., R., Rheumatoid arthritis, in Copeman, W. S. C, editor Text book of the rheumatic diseases, Living Stone, 3<sup>rd</sup> ed pp. 175. (1964).
7. Gasporidy C. et al, Gastric acidity in 200 cases of rheumatoid arthritis Z. Rheumaforsch 23 : 198 (1964).
8. Gibberd F. B., A survey of 406 cases of rheumatoid arthritis, Acta. Rheum Scand. 11 : 62 (1965).
9. Harita, Harita Samhita Shri Venkateshwar Steam Press Bombay. P. 361. (1927).
10. Kelly et al, Text book of Rheumatology N B Saunders Company Philadelphia, U.S.A. (1981).
11. Kishore P., Rheumatoid Arthritis Amavata Etiopathogenesis and treatment, Post Graduate Thesis, Faculty of Medical Sciences, B. H. U. Varanasi (1965).



12. Kishore P & Tripathy S. N., Bhallataka in the management of Rheumatoid Arthritis (Amavata) : A clinical and experimental evidence (Preliminary observations) Rheumatism, Vol. 1, No. 4 (1966).
13. Madhava, Madhava Nidanam, Commentary by Sudarsan Shastri, Chowkhambha Sanskrit Series Officer, Varanasi (1960).
14. Morace G et al, Liver changes in the course of classical rheumatoid arthritis Liver function Tests. Riv –Crit- Clin. Med. 64. 220 (1964).
15. Pandit M. M. et al., Study of Sudha Guggulu on rheumatoid arthritis, Rheumatism, 16 (2), 54 – 67 (1973).
16. Paneri A. et al., Liver changes in course of classical rheumatoid arthritis: II Histological findings, Riv. Crit. Clin. Med. 64 : 293 (1964).
17. Pelikan V. et al., The stomach and progressive polyarthritis Fysiat, Vestin, 36 : 334 (1961).
18. Sarngadhara, Sarngadhara Samhita, Sri Baidyanath Ayurveda Bhawan Pvt. Ltd., Calcutta – 6 (1961).
19. Sen Gananatha, Sidhanta Nidana Pt. II 4<sup>th</sup> ed. pp. 210 (1943).
20. Sharma A. K. et al., Clinical evaluation of Amrtia Bhallataka as a Naimittika Rasayana in the treatment of (Amavata) Rheumatoid arthritis, JRAS, Vol. 11, No. 4, p. 296 – 308 (1981).
21. Sharma P. V., Dravyaguna Vinijana, IIIrd edition part. II, Chowkhambha Sanskrit Sansthan, Varanasi (1975).
22. Sharma Acharya P. V., Ayurvediya Anusandhana Padhati (Methodology of Research in Ayurveda) 1<sup>st</sup> edition Chowkhambha Orientalia, Varanasi (1976).
23. Sharma Priyavrata, Ayurveda Ka Vaijanika Itihasa Chaukhambha Orientalia, Varanasi (1976).
24. Shastri, R. D., Bhaisajya Ratnavali, Commentary by – Ambika Dutta Sastri, Chowkhambha Sanskrit Series Office, Varanasi : (1961).
25. Shatin R., Concept of intestinal etiology in the pathogenesis of collagen syndromes. Acta. Rheum. Scand 10 : 246 (1964).
26. Shatin R., The epidemiology of rheumatoid arthritis and human ecology Acta. Rheum. Scand. 11 : 161 (1963).
27. Shatin R., Preliminary report of the treatment of rheumatoid arthritis with high protein gluten free diet and supplements. Med. J. Aust. 2 : 169 (1964).

28. Sievers K. et al., Liver function in RA, AM. Med. Int. 53 / 2 (55 – 60) (1964).
29. Susruta, Susrut Samhita, Chowkhambha Sanskrit Series Office, Varanasi – 1, (1972).
30. Tewari C. M. et al, Role of Enteropathy in the aetiology of Rheumatoid arthritis, JRMY & H, vol. XIV, No. 2, P. 157 – 165 (1979).
31. Traut E. F., Rheumatic Diseases, C. V. Mosby, Pp. 43 (1952).
32. Tripathy S. N. et al, Role of Semicarpus anacardium (Bhallataka) in the management of rheumatoid arthritis, JRIMY & H, vol. XIV, No. 2 (1979).
33. Tripathy S. N. & Kishore, P., Gastro intestinal Disorder – Enteropathy Vis – a – Vis Rheumatoid Arthritis (Amavata) Rheumatism, Vol. I Bo. 3. (1968).
34. Vagbhata, Astanga Hridayam, Chaukhambha Sanskrit Sansthan, Varanasi (1980).
35. Vagbhatacharya, Rasaratna Samuchhaya, The Chowkhamba Sanskrit Series Office, Varanasi (1970).
36. Vridhavagbhata, Astanga Sangraha, Srimad Atreya Prakasanam, Pune – 4. (1980).
37. Yogaratnakar, Yogaratnakar The Chowkhamba Sanskrit Series Office, Varanasi – 1 (1973).