Unani Medicine: Implications and Applications

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Summary
Unani system of medicine is very much practiced in the countries of South Asia such as India, Pakistan, Bangladesh and Srilanka. Unani system owes its origin in Greece where Hippocrates propounded this medical art of treatment. An introductory analysis about the Unani system of treatment is divulged in this text to understand its conceptual features. The governments of the region have drawn the different Unani health work regulatory frame and policies. Practitioners form one of the basic elements of health chain and their number is growing as with the increase of educational facilities... As Unani utilized medicinal plants for the curative and preventive strategy therefore biodiversity and cultivation efforts are outlined. Manufacturing of Unani drugs are on increase therefore standardization and evolvement of newer drug through focused research are gaining momentum. The pharmacopeias (Qarabadhins) assessment have been given due consideration and the clinical evaluation of Unani medicine for the treatment of amoebiasis, dysmenorrhea, vaginal discharge, osteoporosis and malaria are presented to provide clinical details as evidence based strategy.

1. Introduction
The Unani system of medicine became an indegenious treatment, very much prevalent in south Asia and popular among the masses of India, Pakistan, Bangladesh and Srilanka. Although, Unani system of medicine owe its origin in Greece where Hippocrates, discarded the influence of the supernatural in determining health and disease, and instead, turned to natural causes for explanations. He evolved the theory of the four humors, maintaining that blood, phlegm, yellow bile, and black bile in the human body promoted health or that may lead to disease. According to basic principles of Unani, the body is made up of the four basic elements i.e. earth, air, water, fire which have different temperaments i.e. cold, hot, wet, and dry. After mixing and interaction of four elements a new compound having new temperament comes into existence i.e. hot - wet, hot - dry, cold - wet, cold - dry. The body has the simple and compound organs, which got their nourishment through four, humors i.e. blood, phlegm, yellow bile, black bile. The humor was also assigned temperament as blood is hot and wet, phlegm is cold and hot, yellow bile is hot and dry and black bile is cold and dry. Health is a state of body in which there is equilibrium in the humors and functions of the body are normal in accordance to its own temperament and the environment. When the equilibrium of the humors is disturbed and functions of the body are abnormal, in accordance to its own temperament and environment, that state is called disease. Unani medicine believes in promotion of health, prevention of diseases and cure. Health of human is based on the six essentials (Asbabe
Sitta Zaroorya) if these are followed health is maintained otherwise there will be diseases. Six essentials are atmospheric air, drinks and food, sleep and wakefulness, excretion and retention, physical activity and rest, mental activity and rest. Also, patients are examined systematically to make the diagnosis easy as spot diagnosis with the help of simple techniques, and now with modern gadgets. Diseases are treated in the following ways:

- Ilajbil Tadbeer (Regimetal Therapy)
- Ilajbil Ghiza ( Dietotherapy)
- Ilajbil Dava (Pharmacotherapy)
- Ilajbil Yad ( Surgery)

1. Ilajbil Tadbeer (Regimenal Therapy): Some drugless regimens are advised for the treatment of certain ailments i.e. exercise, massage, hamam (Turkish bath), douches (cold and hot) and the regimen for geriatrics.
2. Ilajbil Ghiza (Dietotherapy): Different diets are recommended for the patients of different diseases.
3. Ilajbil Dava (Pharmac-therapy): The basic concept of treatment is to correct the cause of the disease that in turn corrects the abnormal temperamental condition.

After Hippocrates a number of other Greek scholars enriched the system considerably. Of them Galen (131 - 210 AD) stands out as the one who stabilized its foundation on which Arab physician like Rhazes (850-925AD) and Avicenna (980-1037AD) constructed an imposing edifice. Thus Unani traveled from Greece to Egypt, then to Spain from where it reached Baghdad. From Baghdad it came to Iran where it made tremendous progress and development.

Jundishapur (or 'Gondeshapur') was a city in Khuzistan founded by a Sasnid Emperor Shapur I (241-272 A.D). It was during the Abbasid Caliphate (754-775 A.D.) that Caliph al-Mansur, the founder of the city of Baghdad, invited physician Jirjis Bukhtishu as the head of the Jundishapur School to treat him. Thus, his son Jibrail Bukhtishu established his practice in the city and became a prominent physician. Another family that migrated from Jundishapur to Baghdad was that of Masawayh, who went at the invitation of Caliph Harun-ul-Rashid (786-809 A.D.) and became a famous ophthalmologist. Most famous amongst his three sons who were all physicians was Yuhanna ibn Masawayh. He wrote prolifically and 42 works are attributed to him and also translated the Greek works into Arabic. By the 8th century A.D., the fame of Baghdad began to rise, as did the political power of the caliphate.

The most influential historical figure in this golden era of Unani medicine was Avicenna (980-1037 A.D.), born in Kharmaitan. He gained a very good reputation, such that the ruler of the Samanid Empire (in what is now Iran), Nuh ibn Mansur (reign: 976-997A.D.), sought him out to treat an illness and moved to Hamadan (in west-central Iran). Avicena wrote on diverse subjects such as mathematics, astronomy, geology, and logic. His most important medical work was The Canon of Medicine (Al - Qunun), which remained a valued text throughout Europe and the mid-East for several centuries after his death.
In India Unani system of medicine was introduced by the Arabs. When Mongols ravaged Persian and central Asian cities like Shiraz, Tabrez, and Geelan, scholars and physicians of Unani medicine fled to India. The Delhi sultans, the khiljis, the Tughlaqs and the Mughal emperors provided state patronage to the scholars as court physician. During 13th and 17th century Unani medicine had its hey-day in India. Among those who made valuable contribution to the system in the period were, to name only a few, Abu Baker Bin Ali, Usman Kashni, Sadruddin Damash Qui, Bahwa Bin Khwas Khan, Ali Geelani, Akbar Azazani and Mohd Hashim Alvi Khan.

The Unani medical system flourished in South Asia. Eminent Hakims of Unani Tibb who contributed enormously to develop Unani medicine and their Dawakhana (Clinic and Pharmacy) are as follows. Azmi (2004) in his book on history of Unani medicine in India mentioned the famous two Unani medical families called Kandan-e-Sharifi and Khandan-e-Azizi and these family physician and others made high profile efforts and endeavors for the advancement of Unani medicine.

Ajmal Khan was born in India in 1864, and is generally acknowledged to be the most significant 20th century contributor to Unani medicine in India. His life in India was something like that of Hakim Mohammed Said's in Pakistan; both were humanitarians of the first order who became important leaders and were versed not only in medicine, but in other academic areas, with an intense interest in providing educational opportunities. Ajmal Khan came from the famous Sharif Khani family of Delhi, known best for his great grandfather who made an immense contribution in Unani systems. At about the same time and in the same city, Abdul Majid founded Hamdard. The independent Hamdard Foundation in both the countries i.e. India and Pakistan has the distinction to establish Hamdard University, New Delhi and Hamdard University, Karachi, which are famous for imparting education and executing quality research in Unani medicine.

Unani medicine is a part of culture in South Asia where it is popularly practiced among a large segment of population. Unani Medicine has achieved an exponential growth over the last five decades in South Asia. Practically, Unani medicine is innovative in that it has accepted the challenges professional practice-patient relations, forms of intervention, and disease conceptualization itself. Unani medicine has maintained its popularity in a number of South Asian countries, and that Unani medicines account for more than 30% of the total medicinal consumption.

2. Government Policies: Health

The Ministry of Health and Family Welfare has reorganized the Unani system of medicine in India under the Indian system of medicine and that Central Council for Research in Unani Medicine (CCRUM) is doing its best to develop Unani system. In Pakistan, the cabinet in 2003 approved amendments to the Unani, Ayurvedic and Homeopathic Practitioners Act, 1965 to the Tibb-e-Unani / Eastern Medicine Practitioners Act 1965 with a view that Bachelors of Eastern Medicine and Surgery (B.E.M.S. Unani) graduates will be officially registered to practice Tibb. The manufacture of Unani drugs in India is being regulated through Drugs and Cosmetic Act.
1940 and as amended from time to time. The manufacturing of Unani drug legislation in Pakistan has recently been tabled in the parliament for compliance of GMP, regulatory export import and registration of sales of drugs and others. Although the Drug Act 1940 and its rule formed the basis of Bangladesh drug legislation but Unani medicine were exempted from control under legislation. Srilanka is also under the process to regulate Unani drugs.

3. Practitioners of Unani Medicine

South Asian countries like India, Pakistan, Bangladesh and Srilanka where population lives in rural areas. The rural population entirely and urban population specifically is dependent for their medical care on Unani system of treatment. The registered practitioner of Unani medicine in India, Pakistan, Bangladesh and Srilanka are 42445, 28000, 5000 and 1200 respectively. India has 39 degree colleges / universities for Unani medical education whereas Pakistan contains 2 degree colleges / universities for Unani medical education where as 4 in Bangladesh and three in Srilanka. However in India there are six (6) postgraduates research centre whereas none in the rest of South Asian countries. The education and training facilities in the Unani system of medicine presently monitored by the Central Council of Indian Medicine (CCIM), which is statutory body set up by an act of parliament known as Indian System of Medicine Central Council Act 1970. Higher Education Commission (HEC) in Pakistan has approved the degree and postgraduate curriculum (M.Phil. and Ph.D.) in Eastern Medicine (Unani Medicine) which is a landmark decision to promote Unani medicine in the country. The details of educational program of Unani medicine are given in the table 1.

| Table 1. Comparative Statement of Unani Education in South Asian Countries. |
|-----------------|-----------------|-----------------|-----------------|
| **Pakistan** | **India** | **Sri-Lanka** | **Bangladesh** |
| **Diploma** | Nil | Nil | Nil |
| Fazil Tibb wa Jarahat (FTJ) | Nil | Nil | Nil |
| **Duration of Studies** | Nil | Nil | Nil |
| 4 years | Nil | Nil | Nil |
| **Eligibility of Admission** | Nil | Nil | Nil |
| Matric | Nil | Nil | Nil |
| 10 years education | Nil | Nil | Nil |
| **Degree** | Bachelor of Eastern Medicine and Surgery | Bachelor of Unani Medicine and Surgery | Bachelor of Unani Medicine and Surgery |
| **Eligibility of Admission** | F.Sc.(Pre-medical) 12 year education | F.Sc.(Pre-medical) 12 year education | F.Sc.(Pre-medical) 12 year education |
| 5 Years | Duration of Studies 5 Years | Duration of Studies 5 Years | Duration of Studies 5 Years |
| **Duration of Studies** | 5 Years | 5 Years | 5 Years |
| 5 Years | 5 Years | 5 Years | 5 Years |
| **Degree** | Bachelor of Eastern Medicine and Surgery | Bachelor of Unani Medicine and Surgery | Bachelor of Unani Medicine and Surgery |
| **Eligibility of Admission** | F.Sc.(Pre-medical) 12 year education | F.Sc.(Pre-medical) 12 year education | F.Sc.(Pre-medical) 12 year education |
| 5 Years | Duration of Studies 5 Years | Duration of Studies 5 Years | Duration of Studies 5 Years |

4. Biodiversity

South Asia is a treasure of biodiversity where a large variety of plants and has been identified. India contains more than 8000 species of higher plants including an estimated 2000 endemic species. Of these, 1500 species representing over 1000 genera and 250
families have been used in Indian systems of medicine. While as in Pakistan are recognized 775, 5700, 21, 189 algae, angiosperm, gymnosperm and pterodophytes respectively. In Pakistan approximately 1175 medicinal plants are utilized in Unani system of medicine. Srilanka utilizes more than 200 medicinal plants in Unani medicine. The total number of medicinal plant in Bangladesh at present stands at about 2000 and out of them 450 of such medicinal plant are utilized for curative proposes.

5. Cultivation
Although it is a fact that medicinal plants are collected from the wild source. But cultivation of medicinal plants is usually preferred in the South Asian region and industry prefers raw material from cultivated source because of authentication, reliability and continuity. Non-availability of quality planting material coupled with poor development and extension support in the cultivation and processing and also unorganized markets are the major constraints coming in the way of commercialization of cultivation. Therefore, concentrated efforts are required, both in collection and cultivation of medicinal plants, in order to ensure sustainability of the industry. The ministries of agriculture in the region has started plans to draw the attention of farmers-manufacturer to develop liaison between the parties for contract of the produce so as to earn extra income, thus alleviating the poverty.

6. Standardization of Drugs
The standardization of drugs and quality control is important factors in the treatment of Unani. The different pharmacopoeia committees in the South Asian region were as activated to expedite preparation of standards for Unani drugs. This has led to significant progress where in essential lists of Unani medicine as well as comprehensive list of Muffradat (Simples) and Murrakabat (Compound), pharmacopoeias and formularies have already been finalized and published. Voluntary scheme for certification of quality are also being affected. Unani Pharmacopoeia of India contains 122 single drugs and Central Council of for Research in Unani Medicine (CCRUM) has so far standardized 22 single and 385 compound drugs. Pakistan Tibbi Pharmacopeia approved by the Board of Unani and Ayurvedic System of Medicine, Pakistan under the Act II/1965 was published in 1970.

7. Focused Research
Another important area of concern is the need to undertake much more focused research. Unani systems have a particular strength to cater for preventive and curative health and clinical research into therapeutic claims is being taken up. The phase I, II trials are being conducted into the efficacy of herbal drugs, long accepted in Unani and proved to have efficacy. A number of time-tested drugs of herbal, animal or mineral origin are introduced under program of collaborative efforts with modern hospitals. The Ministry of Health of the region are bringing forward a quality marking scheme which will be open to manufacturers to join on a voluntary basis, whereby certification should be available about the content of the formulations.
8. Establishment of Traditional Knowledge Digital Library
A Traditional Knowledge Digital Library on medicinal plants is being vigorously pursued in India so as to acquire and expose the therapeutic uses of plants. This was being done with a view to documenting information, preserving knowledge, which is the public domain, and making it capable of being retrieved. This will help decide whether the claim is a novelty or an invention.

9. Pharmacopoeia Status
The application of Unani medicine in the prevention and cure of disease is more than five thousand years old. However, this system of medicine flourished in South Asian region since 12th century AD. Till to date a huge amount of information in the form of published material has been accumulated by Unani practitioners. Out of lot of books available, the books on Qarabadhin (pharmacopoeia) are of importance from medical and treatment point of view. Qarabadhin from modern pharmacopoeial perspectives have not been analyzed. Therefore, comparative study on Unani Qarabadhin was under taken and accordingly different text that falls under the category of Unani pharmacopoeia have been classified as official, non-official and unofficial pharmacopoeia. At length the conceptual features of Unani medicine, its clinical evaluation with detail commentaries on enumeration and comments of some typical Unani Qarabadhin are documented. In addition nonofficial, unofficial and official Qarabadhin represent a complexity because that entire pharmacopoeia contains either description of muffaradat (simples) or murrakabat (compound) preparations which it distinguishes itself with modern pharmacopoeial contents that are usually based on simples which leads to categorization of Unani pharmacopoeia and a better understanding of the subject matter.

10. Unani Medicine – Suggestion
- Government and non-governmental organizations should help to create and support education and use of Unani medicines on the priority basis.
- The Governments of South Asian region should promote and support research and development at the university level in order to modernize techniques for producing effective Unani health care products.
- An international symposium on Unani medicine in the different countries of the region is organized with the collaborative efforts of National Organization where in deliberations affirming the importance of Unani medicine and endorsing its integration in the healthcare systems.
- The National workshops on Unani medicine practices and utilization are further channeled so as to facilitate and promote innovative research strategies for Unani medicine through the coordination of interdisciplinary and collaborative research.
- The recommendations be outlined aimed at strengthening the practice of Unani medicines be given priority for the implementation, harmonization and integration of Unani medicine into health care delivery systems.
- The support in the development of guidelines for the protection of intellectual cultural property rights of holders of Unani health knowledge; support the development of appropriate frameworks, and provide guidelines and methodologies for research and evaluation to ensure the quality, safety, efficacy, cost-effectiveness, utilization, and best practices.
Clinical Practice Guidelines be devised and adopted in workshop to create an impact on primary care provider. Clinical or practice guidelines are quality-improving strategies. This means that Evidence-based medicine be defined and practiced that bring together the best external evidence and other knowledge necessary for decision-making about a specific health problem.

South Asia is a region where Unani medicine is contributing its lofty share in on going national health care build up as well as providing scientific basis to the system. This region is destined to be potential Unani hub in time to come and would widen activities in educational and research if ample fund were provided for its growth.

11. Applications in Traditional Medicine
The Unani drugs in the traditional system of medicine are very well documented in literature. In recent years, there has been a growing trend to evaluate the clinical effects of medicine plants used in the Unani system of medicine so that a systematic approach could be adopted for their therapeutic utilization. Our group is engaged to explore some of the herbal drugs used in the Unani system. A brief account of the clinical claims in Unani medicine are presented in the following sections.

I. Amoebiasis
A randomized, clinical, comparative study has been conducted between the formulated herbal medicine Amoebin Cap, allopathic medicine Entamizole DS, herbal proprietary product Endemali and placebo to provide clinically evidence based assessments. Amoebin Cap comprises of herbs such as Phyllanthus emblica, Aegle marmelos, Holarrhena antidysenterica and Myrtus communis. The clinical evaluation involved quite of number of patients living in Karachi. Around 202 patients selected for the ultimate diagnosis and treatment there of amoebiasis. The clinical trial was conducted to assess the drugs and the details of which are given along with tables with its graphic representations. The number of patients assigned to test group that is Amoebin Cap were 80, while in control group 63 patients were registered to Entamizole DS and 50 patients for Endemali along with this 9 patients were hooked on placebo.

These data was collected in the years from 2001 – 2004 which completed the clinical trial protocol and there were total 202 patients, the frequency of male patients were 127 (percentage of male 62.9%) while, 75 were of female patients (percentage of female 37.1%) were enrolled into the study. Using a Chi-Square Test and Fisher Exact Test made statistical analysis. All patients who were treated with Amoebin Cap showed improvement. Out of 63 patients who were treated by Entamizole DS 58 showed improvement and five did not. After applying the test of significance there was significant difference between these two drugs with Fisher Exact Test was applied and p-value was calculated as 0.015 while comparing Amoebin cap with Endemali 50 patients treated with an herbal drug Endemali. Results revealed that all patients, which were treated with Amoebin Cap, showed improvement, and out of 50 patients who were treated by Endemali 30 showed improvement and twenty did not. After applying the test of significance there was highly significant difference between these two drugs with Chi-Square Test was deduced (Yates correct) 34.81 and p-value was found to be 0.000.
II. Vaginal Discharge

Study on vaginal discharge due to vaginitis which is a common symptom in primary health care is presented. Vaginitis being a disorder of multifactor etiology, single-line therapy is often inadequate and recurrence is common. Leuko-off formulation consist of *Acacia arabica*, *Butea monosperma*, *Berberis aristata* and *Salmalia malabarica*, and the literature research of these plants specify their bioactivity as antifungal, antibacterial and antiprotozoal properties in leucorrhea. The bioactivity, chemical ingredients citation on the plants species of the coded anti-leucorrhoea drug as Leuko-off as well as biological activities of extract for anti-leucorrhoea plants taken into account to develop the formulations.

The Leuko-off was administered to 100 female patients and allopathic medicines to 50 female patients from age 14 to 48 years with vaginitis of varying etiology and its potential to eradicate the cause. The most common typical pathogens among evaluable patients were *Candida albicans*, (isolated from 44.7% HVS specimens), *Gardnerella vaginalis* (15.3%), *Staphylococcus aureus* (9.3%), *Bacteroides* spp (8.0%) and *Trichomonas vaginalis* isolated from 6.7% HVS specimens. So, it was conclusively diagnosed that the commonest infection was candidiasis whereas the least infection was mixed vaginal infection. The infection rate of bacterial vaginosis and non-specific vaginitis due to other Cocci and Bacilli was almost same. In mixed vaginal infections patients who were positive after HVS culture for *Candida albicans* were co-infected with other pathogens identified as being infected with *Escherichia coli* and *Klebsiella spp*.

It was clinically observed that clinical failures or HVS positive culture after treatment (no improvement) occurred in 16/100 patients (16%) receiving herbal medicine and in 22/50 patients (44%) receiving allopathic medicines. Overall, clinical success was observed in 84/100 patients (84%) of cases in herbal-treated patients and in 28/50 (56%) of cases in allopathic-treated patients.

Adverse effects observed after administration of medicine were reported in 9/100 patients (9%) receiving herbal medicine and in 26/50 patients (52%) given allopathic medicine. The hepato-toxic and nephro-toxic adverse actions were also had significant differences between test and control groups for measurements of hepato-toxicity (P < 0.000) and nephro-toxicity (P < 0.000). Furthermore “Leuko-off” exhibited antifungal, antiprotozoal and antibacterial activity while in allopathic treatment separate medicines were used for each category.

Statistical analysis using a chi-square test revealed that significant difference was identified (p>0.05) when using Leuko-off for the treatment of infective vaginal discharge in respect to efficacy and side effects. Therefore the null hypotheses were rejected. This concluded that the herbal medicines are effective and safe and there was an overall significant treatment response as antifungal, antiprotozoal and antibacterial when treating infective vaginal discharge with Leuko-off.
III. Primary Dysmenorrhea

Dysmenorrhea is among the most common gynecological complaints. Dysmenorrhea refers to the occurrence of painful menstrual cramps of uterine origin. There are several mechanisms which initiate dysmenorrhea. NSAIDs such as Diclofenac sodium (Voren) are clinically used to relieve the pain in short-term therapy by reducing myometrial activity i.e. contractions of the uterus, but it is not found useful in long-term therapy due to side effects. The detail bioactivity and chemical constituent’s literature on the plants species formulated for Dysmo-off as coded anti-dysmenorrheic drug has been thoroughly reviewed. Dysmo-off, comprises of *Saraca indica*, *Foeniculum vulgare*, *Juniperus communis*, *Mentha piperita* and *Zingiber officinalis*.

A detail delineation of the primary dysmenorrhea methodology, research trial protocol was devised. The clinical evaluation was carried out on 120 patients of ages between 13-30 years in seven consecutive primary dysmenorrheic episodes at Department of Gynecology and Obstetrics in Shifa-ul-Mulk Memorial Hospital for Eastern Medicine at Hamdard University, Hamdard Matab Aram Bagh in Karachi and Civil Hospital, Karachi. These evaluations were based on verbal rating scale so as to ascertain the rate of analgesic effects for dysmenorrheic pain.

Clinical trial statistical data so generated and the results conclusively obtained proved that coded herbal medicine Dysmo-off had a significant greater improvement in combined symptoms of dysmenorrhea compared with those of Voren treatment on 4th follow up (p<0.05). However, the treatment response was not significant from 1st follow up to 3rd follow up (p>0.05). Similarly, post withdrawal efficacy in all follow-ups, dysmenorrheic pain levels shows a highly significant greater reduction in dysmenorrheic pain levels when treated with Dysmo-off compared to Voren (p = 0.000). Comparison of data recorded by participants relating to side effects after the use of Dysmo-off verses Voren showed highly significant differences between test and control groups for these measurements. Hepato-toxicity (df = 1, P < 0.05), nephro-toxicity (df = 1, P < 0.05), and other all side effects (df = 4, P < 0.05) were greater in control treated participants than in tests participants. So the null hypothesis was strongly rejected on the basis of p value calculated by chi-square test in both treatment groups. The conclusion deduced that Dysmo-off is effective and safe for the treatment of dysmenorrhea when compared with Voren.

IV. Anti-malarial

The open, clinical, randomized trial has been carried out on the designed, proprietary clinically and proven different anti-malarial medicine so as to analyze the efficacy and side effects of these drugs. A random controlled clinical trial was conducted to quantify the effect of coded herbal formulation SCAT with Qurs Bukhareen, Qurs Humma Jadeed and Amodiaquine at endemic area of Bund Murad near Hamdard University, Karachi and the urban population of Karachi. Patients at Matab Hamdard Aram Bagh and Shifa-ul-Mulk Memorial Hospital For Eastern Medicine were included in this clinical study. The duration of treatment was from January 2001 to June 2004.
The drugs were prescribed to 264 patients categorizing them into different age from 10 years to 63 years. Three selected drugs were administered to attain successful response to malaria especially caused by *Plasmodium vivax* and *Plasmodium falciparum*. Antimalarial formulation SCAT was administered to 88 patients, among them 56 patients were suffering from *Plasmodium vivax* and 32 were suffering from *Plasmodium falciparum*. In Amodiaquine group 75 patients were treated, where in 41 of *Plasmodium vivax* and 34 patients from *Plasmodium falciparum* infected malaria. Qurs Humma Jaded was evaluated on 56 patients, 42 from *Plasmodium vivax* and 14 patients from *Plasmodium falciparum* infected cases. Similarly Qurs Bukhareen was given to 45 patients, 35 of *Plasmodium vivax* and 10 patients screened for *Plasmodium falciparum*. The response of the treatment on symptomatology of malaria like rigors, bitter taste of mouth, headache, anorexia, nausea, vomiting, malaise, myalgia, abdominal pain, burning micturation, splenomegaly and hepatomegaly were also analyzed.

A comparative evaluation of the anti-malarial treatment by other medicine shows that herbal therapy is safer and proficient in its activity. After statistical analysis coded formulation SCAT was remarkably effective for the associated malarial symptoms. Coded formulation SCAT was cost effective than the other medicines. The statistical analysis through chi-square test (p< 0.05) significantly proved the SCAT efficacy. The statistical analysis of all the variables conclusively proved that SCAT has furnished overall good efficacy, more suitable and effective for the prevention and treatment of malaria. The clinical data generated showed that SCAT is the drug of choice for malaria especially caused by *Plasmodium vivax* and *Plasmodium falciparum*.

**V. Osteoporosis**

A comparative study of Boerhaavia repens with raloxifene was conducted in different hospitals. This study enlisted 86 patients at random, out of 48 were diagnosed as osteoporotic from different age group. The data was collected by applying the designed format. The 48 patients so registered, the number of female and male were 46 and 2 respectively. The associated diseases data on hypertensive, diabetes, arthritis and thyrotoxicoses of these osteoporotic patients were recorded. The clinical study on raloxifene was conducted for a period of three years in which the number of responding patients continued with the therapy the tally remained at 14. Similarly in others designed group which were treated with Boerhaavia repens 18 patients registered but after a period of three years only 8 patients continued with the treatment. Both types of the clinical evaluation were conducted for bone mineral density, bone alkaline phosphatase and serum calcium level. The exclusion criteria observed for the osteoporotic patients include the fracture of the long and hip bone. The range of alkaline phosphatase in post menopausal women without any pathology should be 22-30mg/dl. But in case of osteoporosis this range exceeded up to 80-100mg/dl. After treatment of the selected group of post menopausal osteoporotic women by raloxifene the alkaline phosphatase found to be in the normal limits up to 35mg/dl. When the other group of post menopausal women treated by Boerhaavia repens the level decreased to the range of 32mg/dl. In case of serum calcium, the calcium level decreases up to 6-8mg/dl from the normal range of 8-10mg/dl. With raloxifene, the additional supplements of calcium were administered at the recommended dose of 800-1000mg/day. The T – score indicates how many Standard
Deviation (SD) a patient’s BMD is from the young adult BMD i.e. T – score expresses the percentage (%/Young Adult (YA) value in a different way. Patients with T – score above –1 considered as normal with the BMD up to 1.42 - 1.54 g/cm², while incidence of osteoporosis the value of T – score suggestive of osteoporosis up to –2.5 to –5 with decreased value of BMD i.e. 0.82 – 0.58g/cm² with increased risk of fracture. The group of patients treated with raloxifene shows the improvement in T – Score up to –2 to –1.5 with BMD up to 1.1g/cm². The other group of patients treated with Boerhaavia repens shows significant improvement in the T – Score up to the range of –1.5 to –1 with BMD level 1.18 g/cm². The Boerhaavia repens showed marked improvement in the level of bone alkaline phosphatase and bone mineral density whereas, calcium level was found static. Further statistical studies are in progress.

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