A REVIEW ON SELECTED SOUTH INDIAN REGIME FOR THE SEASONAL MANAGEMENT OF COMMUNICABLE DISEASES

ABSTRACT

The present covid-19 pandemic has become a spotlight on the importance of boosting our immune system and focuses on key gaps in understanding the function of our immune system. While there is an emergence of new strains of viruses and its consequences in today's world, it urges us to spectate on lifestyle modification through natural measures that focuses on boosting our immunity apart from vaccines. These gap area has developed an interest to review the traditional Siddha texts that explains the disciplines of life for various seasons that specifically directs the daily routines to be followed from the dawn to dusk of the day according to seasons. This Siddha system of medicine is an ancient system of Tamil nadu in India which emphasize on *Nithya Ozhukkam* (Seasonal disciplines) in order to lead healthy & disease-free life. The latter rainy season (*Koothirkalam*) can favour the spread of many infectious diseases. While there is a tremendous interest and research in the health-promoting and protective concepts of traditional systems off late, this review article has unravelled the scientific facts of few selected traditional food regime and the concepts of *mukkutra* theory (Trihumoural theory) which can be beneficial to boost our immunity against communicable diseases as recommended in ancient Siddha texts.

Keywords : *Kuthirkalam* – *Mukkutram* theory – Balanced nutritional diet – *Nithya ozhukkam* – *Unave marundhu*.

1. INTRODUCTION

Siddha system of medicine is mainly practiced in the southern part of India. It is one of the earliest traditionalmedicine system in world which treats not only the body but also the mind and the soul. In siddha system of medicine, Pandemics are known as *Kollainoikal/ Thottru noigal*. The Siddhars quoted that *Thottru noigal* are caused by *Kirumi* (pathogens). This traditional system has a wide focus on the lifestyle and dietary regime according to seasons and that plays a pivotal role

in equipping our body to overcome the diseases. In its text *Noi Illa Neri* (Disciplines of life to be disease free) the natural rhythms are divided into six seasons the effect of those seasons in the incidence of disease have been indicated along with dietary guidelines and lifestyle modifications to prevent these diseases.

Recent researches also confirm that dietary role of macronutrients, micronutrients, and the gut micro biome plays a significant role in well-functioning of our immune system{1]. Besides the influence of diet in our Immune system, scientists now also agree with the fact that seasons have their effect on immune system, The study, published in the journal Nature Communications, shows that the activity of almost a quarter of our genes (5,136 out of 22,822 genes tested) differs according to the time of year, with some more active in winter and others more active in summer. This seasonality also affects our immune cells and the composition of our blood and adipose tissue (fat).[2] Hence the present day world has started to excavate the golden rules of ancient tradition from various system of medicines that can benefit the survival of today's mankind in overcoming these pandemic situations by self boosting our immune system.

Siddha science explains that changes in natural rhythms of macrocosm (*Sirupozhuthu & Perupozhuthu*) produce corresponding physiological changes in all the creatures living in *macrosm* (Humans). The aim of present study was to emphasis about Siddha diet & nutrition for communicable diseases in specific to seasonal variation. Siddha system believes that, the immunity of human will be based on *Mukkutram* theory. Siddhars explained dietary regimen which helps to prevent diseases that are susceptible for a particular *Thegi*.*Theriyar* in *Pini Anuga Vidhi Ozhukkam* quoted '*Concept pertaining to habitat, seasons, diet are both preventive & curative'.* According to Siddha system of medicine one should follow *Nithya Ozhukkam* in order to lead healthy & disease free life. Every epidemic, pandemic disease ends up with many kinds of modalities. Our ancestors believed that ***"****Unave marundhu marundhey unavu****"*** meaning let food be the medicine and medicine be food which has been taken as a subject to explore through this review in specific to *Koothirkaalam* (rainy season).

2. MATERIALS AND METHODS

The literature review and analysis of this work involved search on Siddha literature on classical texts with search words including *Noi illa Neri* and its significance. The traditional concepts of *Kaalam* (Seasons), *Unavumuraigal* (Diet) such as its relationship with times of the day were

scientifically explored using web based search engines for relevant recently published research

articles.

3. Siddha Concept of seasons

"*Andathil ullathae pindam, pindathil ulladhae andam"* each year is divided into six seasons of two months duration each known as Perumpozhudhu.

MONTH
Chithirai (April 14- May 14) *Vaikaasi* (May 15- June 14)
Aani (June 15- July 14) *Aadi* (July 15- August 14) *Aippasi* (October 15-November 14) *Kaarthigai* (November 15-December 14)
Maarkazhi (December 15- January 14) *Thai* (January 15-February 14) *Maasi* (February 15- March 14)
Panguni (March 15- April 14), *Aavani* (August 15- September 14) *Purattasi* (September 15-october 15)

For each season there is an Individual daily regimen according to body constitution. Use of various simple Siddha disinfectant techniques play very important role in the maintenance of health and thus prevention Various Communicable diseases. The aim of present study was to emphasis about siddha dietary & nutritional pattern for communicable diseases spreading during *Koothirkalam (ipasi, karthigai).*

3.1.Mukkutram Theory

In siddha system of medicine it said that disease result from derangement of *Mukkutram*. *Uyir thathukkal* literally means 'life force'. In Siddha, *Vaatham, Pitham* and *Kabham* which are the three humours, are responsible for the creation, preservation and destruction of human body and health. When they are in the state of equilibrium (4:2:1-the ratio in which they exist) our body remains in a healthy state while any disturbance in this ratio leads to diseased state or death. In siddha system of medicine it is stressed that derangement of *mukkutram* is the main cause of disease in our body in order to maintain *vaatham, pitha, kabham* in equilibrium state an healthy dietary patterngiven by our Siddhars should be followed.

Vaatham: Represents element 'air and force'. It is responsible for all movements of body and mind.Motor and sensory activities are governed by *Vaatham*.

Pitham: Represents element 'fire'. It is responsible for preservation of health and to maintain thebody heat for normal physiology and dominates chest and abdominal area.

Kabham: Represents element 'earth and water'. It is responsible for strength, all joint movements,body build and endurance. (ref siddha noi nadal)

3.2.Koothirkaalam - latter rainy season (*Iypasi* and *Karthigai*) :

The increased *Pitha* in previous season i.e, (*Aavani* and *Puratasi*) becomes deranged because of cold and reduced heat. To bring down the deranged '*Pitha*' to normal state purgatives and ghee having bitter taste should be taken. According to Siddha concept, sitting in the moonlight in evenings, consuming soft natured easily digestible foodstuffs, Samba rice, pulses, Gooseberry, sugar and honey, bitter, astringent, and sweet taste should be taken during this season. [3].

There are also specific traditional food pattern of therapeutic value to be followed during this season such as *Kadukkai* (*Terminalia chebula*) with *Karkandu* (Sugar Candy), *Milagai Kudineer*

(*Capsicum annum*) and *Rasam* (a common south Indian dietary regime). These dietary regimes have been scientifically analysed through this review as follows:

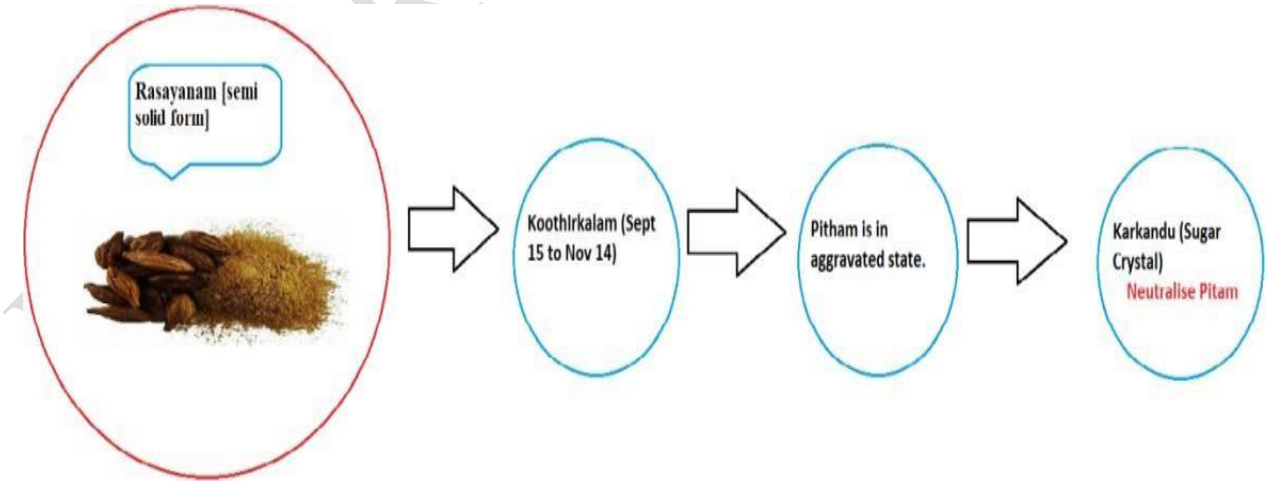
*3.3.*The role of *Kadukkai :*

Kadukkai (Terminalia chebula.) has the capacity to keep our body, mind and soul immaculate. It relieves constipation, removes phlegm and accumulated toxins from our body. An easy and simple preparation method of *Kadukkai* serves as a simple and effective drug in curing and preventing diseases successfully in the respective seasons (*Kaarkaalam, Koothirkaalam, Munpanikaalam, Pinpanikaalam, Ilavenilkaalam, Mudhuvenilkaalam*).

Terminalia chebula (TC), belonging to family *Combretaceae* and commonly known as “Black Myrobalan” is found in India as well as in many Asian countries. *T. chebula* is called the "king of medicines". [4] *T. chebula* are well effective in producing antibacterial activities against gram-negative bacteria, particularly the agents causing *gastroenteritis Pseudomonas aeruginosa and E. coli*. [5][6] The aqueous and ethanolic extracts of *T. chebula* fruit are known to have antibacterial properties against bacterial isolates *P. aeruginosa, K. pneumoniae, S. sonnei, S. flexneri, S. aureus, V. cholerae, S. paratyphi-B, E. coli, E. faecalis and S. typhi*][7] *T. chebula* fruit aqueous extracts also have antibacterial activity against *methicillin resistant S. aureus (MRSA) and trimethoprimsulphamethoxazole resistant uropathogenic E. coli.* [8]

In *Koothirkaalam, Pitham* will be in aggravated state, to bring it in equilibrium state, *Kadukkai* should be takenin semisolid form along with *Karkandu*[Sugar Crystal].

Figure-1. Role of Kadukkai Karkandu during *Koothirkalam*



3.4.Milagai Kudineer for later Rainy seasons Communicable Diseases :

Milagai Kudineer can be prepared by taking one chopped chilli, one table spoon of Cumin seeds (*Seeragam*), few pinches of *Curcumin* powder (*Manjal*) in 200 ml water and boiled for two minutes. 50 ML of this decoction can be consumed twice a week during *Koothirkalam* . This has been indicated to strengthen our immunity, reduces the lethargy and offers protection against infectious diseases.[9]

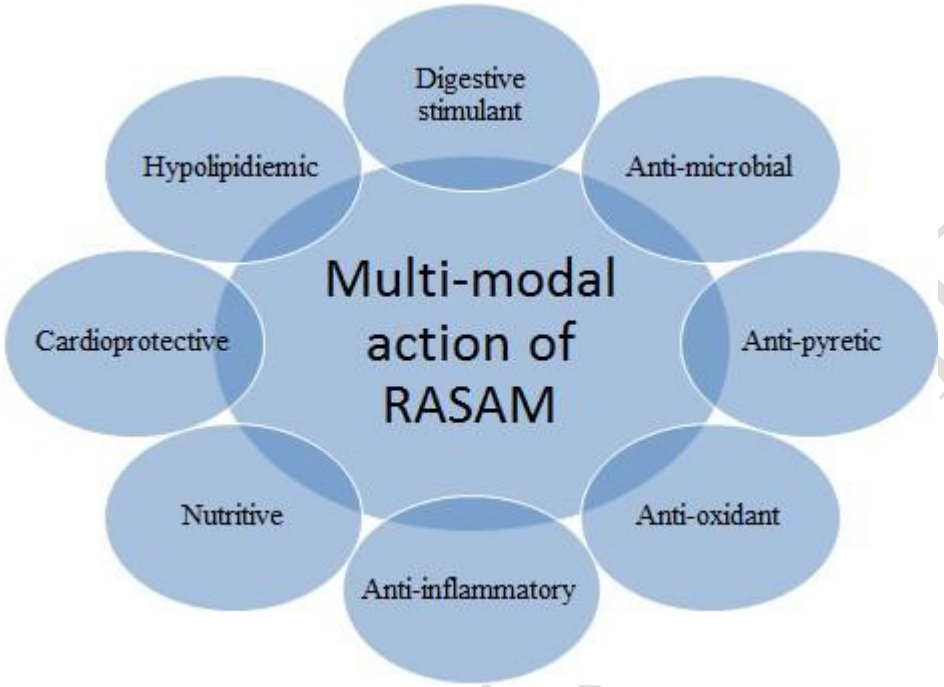
The cheif ingredient of *Milagai Kudineer* is Chilli Pepper (*Capsicum annuum* L.) a member of the *Solanaceae* family. It is a commonly used spice and believed to be originated from Central and South America. [10] It has excellent sources of phytochemicals, such as *anthocyanins,* vitamins, phenolic acids, flavonoids, carotenoids, and capsaicinoids.[11] [12]

A research study by Lu et al., (2012) revealed the bacteriostatic and bactericidal activities of Methanol extract of *C. annuum* (MECa) fruits. The ATPase/H^+ proton pumps of the bacteria were potential targets of the *C. annuum* fruit extract. The inhibition of these pumps by MECa will therefore be lethal for bacteria because it will prevent the excretion of protons in the external environment, thus making the environment less acidic, compromising the survival of the bacteria. Moreover, the enzymatic activity of the respiratory chain dehydrogenases in the bacterial suspensions was also inhibited by the *C. annuum* fruit extract. This result suggests that the active components of MECa might bind to the cell surface and then penetrate to the target sites, possibly the phospholipid bilayer of the cytoplasmic membrane and also membrane-bound enzymes. [13]

*3.5.*Rasam – The common South Indian Soupy regime

Rasam is a classic example of traditional functional food with all its ingredients medicinally claimed for various ailments. It is a traditionally prepared soup using tamarind juice as a base, with the addition of Indian sesame oil, turmeric, tomato, chili pepper, pepper, garlic, cumin, curry leaves, mustard, coriander, asafoetida, sea salt and water. It is always a part of daily lunch in any south Indian home. The processing in the formulation of *rasam* involves heating the spices in water and oil. This processing provides tremendous opportunity for a complete synergetic effect or breakdown of inactive metabolite to an active one or formation of new chemical entities.[14] It is traditionally claimed to be effective for all types of gastrointestinal and respiratory illness. The multimodal action of *Rasam* has been shown in Figure-2. The ingredients have been analyses to have a wide spectrum of action towards the management of communicable disease as follows

Figure-2. Multimodal action of Rasam



3.5.1. Tamarind (*Tamarindus indica*)

Tamarindus indica L. (Tamarind) is a well-known tree belonging to the family Leguminosae [15] T. indica tree is well known for its fruit, which initially shows a reddish-brown colour that turns black or black-brown, aromatic and sour on ripening. This part is most commonly used for Indian cooking and as a base for the dietary regime *Rasam*. [16] The fruit is very rich in minerals, potassium, phosphorus, calcium and magnesium. Many parts of tamarind plant have long been used in traditional medicines for the treatment of a wide variety of ailments and diseases such as jaundice, gonococci and gastrointestinal disorders

Though tamarind was found to be effective against both groups of bacteria its activity was high in Gram positive bacteria as compared to Gram-negative bacteria. pH is known to control the growth, development and sporulation of all microbes including bacteria. The pulp of the young fruit is very sour and acidic and due to the change in pH of the medium to acidic range. It also contains small amount of *terpenes (limonene, geraniol), phenyl propanoids (safrole, cinnamic acid, ethyl-cinnamate), methyl-salicylate, pyrazine and alkylthiazoles* [17] [18] [19] [20] The tannins present

in the pulp of tamarind has been related to their ability to inactivate microbial adhesions, enzymes

and cell envelope proteins. They also form complex with microbial polysaccharides [21].

The demonstration of antibacterial activity against both gram positive and gram negative bacteria may be indicative of the presence of broad spectrum antibiotic compounds in Tamarind.

3.5.2. Sesame oil (*Sesamum indicum*)

Sesame oil (SO) is an excellent nutritional supplement commonly used in traditional Indian diet. It is popularly known as “Queen of Oilseeds” and it is a rich source of vitamin K, vitamin-E, omega-3 fatty acids, polyunsaturated fatty acids, magnesium, copper, calcium, iron, silicic acid, phosphorus and vitamins A and B. Besides these it also contains sesamin, a lignan, that offers nutritional benefits to the body and lecithin, a molecule that plays a role in the prevention of vascular diseases, improves blood vessel elasticity, and hinders cholesterol built up in the arteries. The seeds are a rich source of antioxidants and bioactive compounds including phenolics, phytosterols and phytates. [22].

Sesame seeds have a wide therapeutic application in Chinese and Indian system of medicine. Sesame oil has burn healing effects as it soothes a minor burn or sun burn when rubbed externally and it also fastens the healing process. [23] When applied topically, it aids in healing the chronic diseases of the skin. In India, it has been used as an antibacterial mouthwash, to relieve anxiety and insomnia and in the treatment of blurred vision, dizziness and headache. [24][Sesame oil is naturally antibacterial for common skin pathogens such as *Staphylococcus* and *Streptococcus* as well as common skin fungi such as athlete's foot fungus.[22]

3.5.3. Tomato *(Lycopersicon esculentum Mill.)*

Tomato *(Lycopersicon esculentum Mill.)* is termed as "the most popular vegetable fruit".It is a fruit of good nutritive value as it is fairly rich in vitamins (vitamin C), and other minerals like calcium, phosphorus and iron. A study by Katalin et al.,(2019) showed that total lipids represented 21% from the tomato seeds, with linoleic acid being the major compound. The extracts had good antibacterial activity against Gram-positive bacteria Staphylococcus aureus, which correlated well with the amount of isochlorogenic acid in each tomato variety. The antioxidant activity was high for all genotypes, and especially for the *Tiny Tim* variety which contains significantly higher amounts of flavonol glycosides and isochlorogenic acid than the other varieties[23]. GC-MS analyses of the tomato oil identified 87 compounds, among which are oleic acid, palmitic acid, heptadecanoic acid, octadecanoic acid, linoleic acid, 9-octadecenoic acid, stigmasterol and

cycloartenol. The presences of phenolic acids, polyphenols and flavonoids play very important in their antioxidant activities and antibacterial properties. [25]

3.5.4. **Pepper** ***(Piper nigrum L.)***

Black pepper native of south India popularly known as" king of spices". Pepper is mostly used in the curry recipes as masalas and also as ingredient in the prescriptions of folk medicine as aphrodisiac, carminative, stomachic, antiseptic diuretic and for the treatment of cough, rheumatoid arthritis, peripheral neuropathy, melanoderma and leprosy due to the presence of volatile compounds, tannins, phenols and other unknown substances [26, 27-29] The spicy tang of pepper is due to the presence of piperamides which are the pungent bioactive alkaloids accumulate in the skin and seeds of the fruit. Black pepper is composed of carbohydrate of 37.4%, proteins of 25.5%, fbres of 23.6%, moisture of 4.7% and fat of 5.3%, as well as minerals, including 0.66% potassium (K), 0.20% calcium (Ca), 0.16% phosphorus and 0.16% magnesium (Mg) [30, 31].The main volatile favour compounds in black pepper are terpenes, and black pepper oils contain nitrogen-containing compounds [32,33]. The Key odorants of black pepper are α- and β-pinene, myrcene, α-phellandrene, limonene, linalool, methyl pro- panal, 2- and 3-methylbutanal, butyric acid and 3-methylbutyric acid. Compounds 2,3-diethyl-5-methylpyrazine and 2-isopropyl-3-methoxypyrazine are responsible for the musty and mouldy of-favour in black pepper [34].Among them piperine is the major chemical constituent responsible for the bitter taste of the black pepper. In the present study piperine was evaluated for its antimicrobial activity against Staphylococcus aureus, Bacillus subtilis, Pseudomonas aeruginosa, Escherichia coli, Alternaria alternata, Aspergillus niger, Aspergillus flavus and Fusarium oxysporum. The antibacterial activity was measured by agar well diffusion method and antifungal activity by poisoned food technique. Piperine showed antimicrobial activity against all tested bacteria with zone of inhibition ranged from 8-18mm. Maximum zone of inhibition was against Gram positive bacteria Staphylococcus aureus (18mm) and minimum against Gram negative bacteria Escherichia coli (8mm). Piperine showed maximum antifungal activity towards Fusarium oxysporum (14mm) and very least effect against Aspergillus niger (38mm). The results showed significant activity of piperine and suggesting its use as natural antimicrobial agent.[35]

3.5.5. **Mustard** ***(Brassica juncea)***

Mustard is a *cruciferous* vegetable used as a food spice and folk medicine worldwide. Mustard contains numerous phytochemicals such as: vitamins, minerals, dietary fiber, chlorophylls, glucosinolates (and their degradation products), polyphenols and volatile components(allyl isothiocyanate, 3-butyl isothiocyanate, etc.). In addition, mustard has a wide pharmacological

activities including anti-oxidation, anti-inflammation, and bacteriostatic and antiviral activity.. [36] With the background of Brassica species in the treatment of various infections since the Vedic

period, the seed oil had been investigated for its anti-microbial activity and were screened for their in vitro anti-microbial activity Pyogenic Microbes - Streptococcus Pyrogens, Staphylo-Coccus Aureus And E.Coli. by Agar Cup Dilution Technique against standard chemotherapeutic agents, by using 12 antibiotics, sensitivity discs. In vitro study revealed out that water extract and methanol extract possess significant antimicrobial activity in Vitro. Both the extract possesses antimicrobial activity against all 3 pyogenic bacteria and potent as standard 12 antimicrobial drugs. The extracts showed a broad spectrum of antibacterial activity, inhibition zones of bacteria strains ranged from 3-12 mm for Staphylococcus aureus,3-15mm for Streptococcus pyrogens 5-12mm for E. coli. [37]

3.5.6. **Coriander** ***(Coriandrum sativum)***

Coriander a rich reservoir of micronutrients and nutritional elements has been used as a herb for thousands of years. Coriander is very low in saturated fat however, contains good amount of linoleic acid which is a good source of α-tocopherol and vitamin K. Leaves of plant are rich source of vitamins while seeds are rich in polyphenols and essential oils.[38] The major compounds present in essential oil are linalool (67.70%); α-pinene (10.5%); γ-terpinene (9.0%); geranyl acetate (4.0%); camphor (3.0%); and geraniol (1.9%) [39]

Essential oils from commercial samples of coriander were analysed by GC-MS and assayed for their antibacterial, antifungal and antioxidant activities. Twenty-five genera of bacteria and one fungal species (Aspergillus niger) were used as test organisms. The essential oils showed a high degree of inhibition against all the microorganisms tested [40].Coriander also had highly inhibitory action (MLC, 25 to 50 ppm) to E. coli O:157:H7 and to the other bacteria and fungi tested [41].Pradeep et al. reported the efficacy of coriander essential oil on seed mycoflora and seedling quality of some crop species. Tolkunova [42]

The formulation of horsemint–fennel–coriander was found effective against Gram-positive microorganisms. Coriander (also called cilantro) contains an antibacterial compounds that may prove to be a safe, natural means of fighting Salmonella, a frequent and sometimes deadly cause of foodborne illness; Mexican researchers isolated the compound - dodecenal - laboratory tests showed that this is twice as effective as the commonly used antibiotic drug gentamicin at killing Salmonella where as most natural antibacterial agents found in food have weak activity [43, 44].

3.5.7. **Asafoetida (*Ferula asafoetida*)**

Ferula asafoetida Linn. belonging to the family *Umbelliferae* is a main source of asafoetida, a strong, tenacious and sulfurous odor, and oleo-gum resin of medicinal and nutritional importance.

Asafoetida has been consumed as a spice and a folk medicine for centuries. Sulfur compounds in *F. asafoetida* resin show various biological activities and can be valuable in

medicine. [45] Crude extracts of asafoetida were evaluated for their antimicrobial activity against various fungal and bacterial strains. It was observed that alcoholic and aqueous extracts of asafoetida showed significant effect against *Bacillus subtilis*, *Staphylococcus aureus*, *Escherichia coli*, *Pseudomonas aeruginosa* and *Aspergillus niger* by the agar disc diffusion method. The crude extract showed a broad spectrum of antimicrobial activities by inhibiting the respective fungi and bacteria. [46]

3.5.8. **Turmeric (***Curcuma longa***)**

Curcuma longa L. (turmeric) is a medicinal plant that botanically is related to Zingiberaceae family. Turmeric powder, derived from the rhizome of *Curcuma longa*, is commonly used as a spice, food preservative, and food-coloring agent. [47] [48][49] It has been used topically on the skin for wounds, blistering diseases such as pemphigus and herpes zoster, for parasitic skin infections, and for acne. It has been used via oral administration for the common cold, liver diseases, urinary tract diseases, and as a blood purifier. For chronic rhinitis and coryza, it has been used via inhalation [50] [51] The antibacterial activities of different turmeric extracts were tested against Escherichia coli, Staphylococcus aureus, Salmonella typhi and Candida albicans by disc diffusion method. Water extracted samples of turmeric stored at room temperature inhibited the growth of Escherichia coli and Salmonella typhi Curcumin, a principal bioactive substance of turmeric (*Curcuma longa L.*), is reported as a strong antioxidant, anti-inflammatory, antibacterial, antifungal, and antiviral agent. [52].

3.5.9. **Ginger**(*Zingiber officinale Roscoe*)

Ginger, which belongs to the *Zingiberaceae family* has been commonly consumed as a spice and an herbal medicine for a long time Ginger (*Zingiber officinale Roscoe*) is a common and widely used spice. It is rich in various chemical constituents, including phenolic compounds, terpenes, polysaccharides, lipids, organic acids, and raw fibers. The health benefits of ginger are mainly attributed to its phenolic compounds, such as gingerols and shogaols. Accumulated investigations have demonstrated that ginger possesses multiple biological activities, including antioxidant, anti-inflammatory, antimicrobial, anticancer, neuroprotective, cardiovascular protective, respiratory protective, antiobesity, antidiabetic, antinausea, and antiemetic activities. [53]. Ginger root is used to attenuate and treat several common diseases, such as headaches, colds, nausea, and emesis. The phenolic compounds are mainly gingerols, shogaols, and paradols, which account for the various

bioactivities of ginger [54]. In recent years, ginger has been found to possess biological activities, such as antioxidant [55], anti-inflammatory [56], antimicrobial [57], and anticancer [58] activities.It

has been known that overproduction of free radicals, such as reactive oxygen species (ROS), plays an important part in the development of many chronic diseases [59]. Several studies have found that ginger also has high antioxidant activity [60,61]. a fraction of the dried ginger powder abundant in polyphenols showed high antioxidant activity based on data from FRAP, oxygen radical absorbance capacity, and cellular antioxidant activity assays [62].

3.5.10. Garlic (*Allium sativum*)

Garlic (*Allium sativum*), is commonly used as a spice and traditionally used for its medicinal value since ancient times. Recent studies support the effects of garlic and its extracts in a wide range of applications. Due to the presence of sulfur containing compounds, high trace mineral content and enzymes, garlic has been reported to have implications in disease management and play a role as anti-microbial, anti-obesity, anti-oxidant and many. It contains various active compound such as allicin, ajoene, diallyl disulfide and S-allyl-cysteine that modulates various biological cascades and prevent the pathogenesis.

Garlic (*Allium sativum Linné*) is a widely distributed plant and is used in all parts of the world not only as a spice or food, but also as a popular remedy for pathological states.[63] Numerous studies have previously demonstrated that garlic may be useful for the prevention of carcinogenesis, cardiovascular, and age-related diseases.[64] Especially, it has been strongly suggested that its medicinal and beneficial properties are attributed to specific organosulfur compounds.[65-68] Sulfur compounds isolated from garlic exert anti- inflammatory properties. There are numerous reports indicating the efficacy of garlic in the prevention and treatment of a variety of diseases and for validating its traditional uses. [63-68]

3.6. Warm water consumption

Water is essential for life. Water comprises from 75% body weight in infants to 55% in elderly and is essential for cellular homeostasis and life. he effects of variation in water intake on health and energy intake, weight, and human performance and functioning.[69] Hot water is regarded in the traditional system as the ultimate detox, not only is it more effective in flushing out toxins from our system, continuously drinking hot water can also boost the metabolism, increases the blood circulation etc.[3].To utilize the nutrients present in the water by our tissues, it is always good to be taken after sometime from having food or before food.

The mammalian gut microbiota plays vital roles in maintaining intestinal homeostasis, resisting the invasion of pathogenic microorganisms, and stimulating the development of the immune system. [70][71] Epidemiological investigations have revealed that cold temperature can increase

the risk of diarrhea in children alters the gut microbiota, which may be associated with the pathogenesis of various intestinal diseases, such as inflammatory bowel diseases. Also similar observations have been made in early postweaning livestock. Recent studies by Wang et al., (2019) have analyzed the effects of drinking warm water on the growth performance and gut microbiota structure of postweaning rabbits during winter. Their results confirmed that drinking Warm water improved the growth performance and optimized gut microbiota in early postweaning rabbits during winter. [72]

Drinking hot water soaked along with *Athimathuram* (*Glycyrrhiza glabra*) or *Thuthuvalai leaves* (*Solanum trolibatum*) leaves prevents seasonal infections. Alcohol extracts of glycyrrhiza displayed antimicrobial activity in vitro against *Helicobacter pylori, Staphylococcus aureus* (including antibiotic resistant strains), *Streptococcus mutans, Mycobacterium smegmatis, Bacillus subtilis, S. pyogenes, Haemophilus influenzae, Moraxella catarrhalis,* and *Candida albicans.* The majority of the antimicrobial effects are due to isoflavonoid components, with the saponins having a lesser antibacterial effect. [73]

Thuthuvalai (*Solanum trolibatum*) has a rich source of tannins, saponins, flavanoides, phenolic compounds, cardiac glycosides and carbohydrates that are therapeutically effective. A study which tested the aqueous methanol and n-butanol extracts of aerial parts of Solanum trilobatum L. (Solanaceae) for antimicrobial activity by disc diffusion method found that extracts from leaves, flowers, stem and fruits revealed antimicrobial activity against Gram (+) and Gram (-) bacteria. Maximal antibacterial activity was seen against Klebsiella with aqueous extract whereas methanol extract of stem showed maximal activity against Staphylococcus aureus.[74] Hence drinking warm water soaked with these herbs would it as a health drink during latter rainy season in the prevention of communicable diseases.

4. CONCLUSION

Various traditional cultures have reaped health benefits through their dietary regime with therapeutic values. The benefits of South Indian diet have extended the curiosity that food can have an expanded role that goes well beyond providing a source of nutrients according to the concept of "*Unave marunthu marunthey unave*" meaning let food be the medicine & medicine be the food. In this review we have focused on traditional aspects of diet and lifestyle to overcome and combat the communicable diseases of *Koothirkalam* (Latter rainy season).

NOTE:

The study highlights the efficacy of "Siddha" which is an ancient tradition, used in some parts of India. This ancient concept should be carefully evaluated in the light of modern medical science and can be utilized partially if found suitable.

COMPETING INTERESTS DISCLAIMER:

Authors have declared that no competing interests exist. The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

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