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SUMMARY AND CONCLUSION

India is one of the multitude of religious castes, and creed and has a huge tribal population, which has been in the country for ages. According to census of 2011, there are 533 tribes with the tribal population of 84,326,240, constituting 8.2 percent of the total population in different states of India. Tribal population in Kerala is 4,84,839 constituting 1.45 percent of the total population. The percentage of tribal population in Wayanad District is 18.53 which is 31.24 percent of the total tribal population of the Kerala State. Tribes constitute 1.64 per cent of the total population of Kannur and it is 8. 53 percent of the total tribal population of the State. The areas selected for the present study was Aralam Panchayat of Kannur and Pulpally Panchayat of Wayanad District of Kerala state. Generally scheduled tribes of our country are primitive, the most conservative, geographically isolated, shy, socially, educationally and economically vulnerable, which impede their growth and development in all walks of their life.

Kerala showed that continuous morbidity and mortality especially, maternal and infant mortality rate leads to Genocide, Ethnocide or excess cultureocide of tribes, mainly due to malnutrition. The major causes of malnutrition include inadequate food supply, inequitable distribution of food within the household, improper food storage and preparation, taboos against eating certain foods and lack of knowledge about nutritious food lack of proper nutritional and health caring and knowledge and malnutrition hampers women's productivity. There have been a number of researches on the tribal society, but only few studies focus on the health and nutritional status of tribal girls, in India. The health of tribal girls in particular is conceptualized within the social contact in which they are embedded. Since research in these areas of tribal girl's health status is scant, it would be of immense value to study their health status, nutritional and life style pattern to acquire knowledge related to these nutritional and health aspects. As a tribal girl occupies an important place in the future of her own tribal society. As well as, there is an urgent need to uplift their health and nutritional status. Focusing this, diversified efforts and concerted endeavors have to be undertaken to promote their health and nutritional status. Among the various efforts, production of nutritious food

items at their door steps along with nutrition education is the most important concerted endeavor.

This study was conducted in eight different phases. Initially, a total of 600 tribal girls (10-15 years) were selected for the present study. Among 600 tribal girls, 300 girls were from Aralam Panchayat. Out of 300 girls 150 were selected from non-tribe girls and 150 selected from migrant tribe girls. Another 300 girls were selected from Pulpally Panchayat, consisted of 150 non-tribe girls and 150 primitive tribal girls. During first three phases, nontribal girls were included for the study to perceive differences between the two tribal and nontribal groups in terms of their socio economic status, dietary and life style pattern, and nutritional and reproductive health status and their health and nutritional knowledges. In the fourth phase on the basis of clinical examination, clinical screening of anemia was carried out. Based on the grade of anemia, willingness and cooperation of the tribal girls (13-15yrs), 200 anemic girls (13-15 years) were selected. Purposive sampling method was adopted for this study. Nutrition garden executed among the families of the experimental group of tribal girls (50 girls from both area) by providing seeds and seedlings and data related to the wild edible flora and fauna in their surroundings were gathered and nutrient content of selected flora was estimated using FESEM analysis and phytochemicals were qualitatively analyzed using proper standard procedure. Healthy dietary and lifestyle, personal and menstrual hygiene, nutritional and reproductive health awareness and importance of nutritional sources were created among the selected tribal subjects. Modification of their lifestyle and dietary pattern thorough continuous instruction and frequent guidance for one year and enhanced their nutritional and reproductive health knowledge, attitude and practices. Gathered data were computed statistically using Minitab.17.

The salient outcomes of the present study are given below.

- Selection of subjects for the study revealed that 59 and 55 percent of the non-tribal subjects and 65 and 61 percent of the tribal girls in the age group of 13-15 years in Aralam and Pulpally area respectively and 41 and 45 percent of the non-tribal girls and 35 and 39 percent of tribal girls were in the age group of 10-12 years.
- Data related to the facilities available in the tribal areas pointed out that 45 percent of non-tribal girls from Aralam and 48 percent from Pulpally had own well to meet their water needs especially for drinking purpose. Forty eight percent of Aralam tribal girls used bore-well water for their needs and 88 percent of the Pulpally tribal girls depended pipe water for their water needs and requirements.

- It was very perceptible that cent percent of the families of the non-tribal girls from Aralam and 92.7 percent of the families of the non-tribal girls from Pulpally had the electricity facility whereas 82 percent of the families of the tribal girls from Aralam and 68 percent of the tribal families from Pulpally had electricity availability.
- The common factors observed among the selected tribal communities for the study were:
  - Their language has no script
  - Each tribe had a common leader
  - Each tribe worships their own Gods (Stone Gods): Their Gods are stones, and they keep those stones in the leader's house. During the festival they placed these stones under a tree and it becomes Holy. They believed that the stone has the power of God
  - The primitive way of life
  - They had a particular way of life, customs, culture and traditions and followed strictly.
  - Dressing: They have a special pattern for wearing their dress. Both men and women normally wearing 'Lungi'. Nowadays the women started to wear 'Sarees' in their own way. New generation started to imitate the nontribal people in their dress style.
  - Ornaments: Most of their ornaments are distinctive and are made of dried palm leaves and seed beads. Their 'Mangalyasuthra' (Thali) made up by piercing old coins. The number of coins depend upon the wealth of the family.
  - Tattoo: They tattooed their body. They mark preferred design on body using sharp thorns and then apply powdered charcoal in to the tattoo designs and let it to dry with the blood and keep it for one week without washing it.
  - Bride prize: The man should give money to the father of the girl during marriage as a token of gratitude.
  - 'Manjal neeru': The tribals celebrate the puberty of the girl child by giving sweets and decorate her with flowers and ornaments. Older women took her to a nearby river to bathe with turmeric paste.

- Pregnancy: Government provided ₹.350.00 when a tribal women given birth to her child in the Government hospital in order to promote the hospital delivery. Very few cases were recorded among them as home delivery.
- Lactation: The tribal mothers did not aware the health benefits of colostrum. They did not let the new born to feed the colostrum. They consider it as impure milk and unhealthy to the child.
- Funeral: They buried the dead bodies in the river bank. For this purpose, they dug a deep pit (in slanting position) in the river bank. The dead person's favorite things were buried with the body in the pit. Tribals believe that this type of activities are fulfilled their desire and make them happy.
- Addictions: Most of the tribal women and men are addicted to alcohol and betel chewing. Traditionally, they had a way of preparing alcohol. Many of them are experts in this preparation and used whole grains and cashew apples for this preparation. Betel chewing (Pokala Murukan) is one of their favorite habits. They are made with tender betel leaves, areca nut, lime and dried tobacco (Pokala) and very few persons are out of this habit. The painful truth is that many young children are addicted to these practices. Both children and their parents are unaware of the consequences of these addictions.
- Lack of knowledge regarding the modern equipment and technology
- Clustered life is enjoyable
- Each tribes have their own traditional arts
- Follow the traditional food pattern
- They don't trust the outer world
- They lead life by knowing the rhythm of the forest
- They protect and save wild resources for future generation
- Well known about the medicinal value of each of the herbs
- Believed and expertized in the traditional naturopathic and Ayurveda medicines

- Eighty two to 88 percent of tribal girls were belonged to low income family. Nearly fifty percent of the non-tribe girls were from middle income group. Joint family system was preferred by tribals when compared to the non-tribal counterparts. None of the tribal family had less than three members whereas none of the non-tribe family contains more than 11 members in their family. Sixty five percent of the tribal girls from Pulpally Panchayat came from family holds 8-10 members.

- Forty three and 36 percent of the nontribal families from Aralam and Pulpally areas respectively spent more than ₹. 2351.00 for education and food. At the same time, none of the tribal girls spent appreciable amount of their income for education and purchasing of the food items. Sixty five and 83 percent of the tribal families spent less than ₹. 350.00 on their food, 92 and 85 percent of tribal spent the same amount for their health and medicinal need in these study areas respectively. Eight and 15 percent of tribal girls did not spend any money for this purpose. It was observed that none of the tribal families from Pulpally had spent money to purchase menstrual absorbents. Almost all the selected tribal girls spent less than ₹. 50 to purchase sanitizers, since the present study also focused menstrual hygiene.
- Seventy five and 65 percent of tribal girls in Aralam and Pulpally respectively had secure house whereas 14 percent tribal girls from Pulpally and five percent tribal girls from Aralam didn't have a proper house. Nearly 79 percent of the tribal families had kutcha type house with or without minimum facilities for their living. Cent percent of the non-tribal families had a house with more than 700sqft area. Eight percent of the tribal families from Aralam Panchayat had a house with total area of 501- 700sqft. Seventy five and 61 percent of the tribal families is Aralam and Pulpally respectively had a house with the total area of 301- 500sqft. Ninety five percent of the nontribal families had minimum of 50cent land as their own. Tribals from Aralam were migrated community and government provided one acer land per family at the time of their rehabilitation. Tribal families from Pulpally is provided with 40 cent of land per family, but eight percent of the Pulpally tribal subjects didn't have any land in their ownership.
- Both parents of the non-tribal girls were educated at least high school level whereas most of the parents of tribal girls were illiterate or had education up to basic primary school level. The tribal communities were engaged with agricultural works. From the childhood onwards, parents of the selected tribal girls were forcefully directed in to the agricultural labors to meet their daily basic economic needs.
- Occupational status of the tribal families revealed that 59 and 25 percent of the mothers and 25 and 21 percent of the fathers of the tribal girls from Pulpally were agricultural labors and coolies. Twenty six percent and 12 percent of the mothers and 29 and four percent of the fathers of the tribal girls from Aralam were agricultural

laborers. Twenty two and 33 percent of mothers of the non-tribal girls were not engaged with any job outside the home and they were home makers. Six and four percent of fathers of the nontribal girls did not go for any work due to some health issues. Nearly twenty three and 10 percent of mothers and 45 and eight percent of the fathers of the tribal girls from Aralam and Pulpally had jobs in forest or forest related institute or in estate.

- Even though the amenities were far away from their tribal area, the government established services like Public Health Centre (PHC) and Anganwadi near to the tribal communities. Some of the PHC were not worked properly. The tribes went to government hospitals in serious health issues. Anganwadi stands as a center for the distribution of food supplements and ICDS programs for the tribal young girls and other vulnerable group of tribal population. Around 70 percent of the nontribal girls had excellent transportation to and from their place of residence. They had their own vehicles, or afforded taxi to heir for their need. Tribals rarely used public or private transportation, and were preferred to walk.
- Assessment of nutritional status in terms of recording height, weight and BMI between the tribal and nontribal subjects revealed that, severe stunting was observed among the tribal girls and more than 60 percent of them were underweight.
- Pulpally tribal girls were in the superior position of nutritional deficiency when compared with other nontribal girls. It was shocked to note that VAD (Vitamin A Deficiency), in terms of poor night vision, Xerophthalmia and Bitot's spots were noted in meagre percent. Anemia was the most commonly observed symptoms among the selected tribal and nontribal girls. Study among girls conducted by Shrinivas (2014) in Wayanad District showed the results that 97 percent of the young girls were anemic. Thirty four and 21 percent of tribal girls in Aralam and Pulpally area respectively possessed the sign of koilonychia and 41 and 38 percent of the selected tribal girls had brittle nail in both study area respectively. Thirty five percent of the nontribal girls had white mark on their nail whereas 45 and 55 percent of the tribal subject from Aralam and Pulpally area respectively had the white mark on their nail. Among the Pulpally tribal girls 59, 79, and 76 percent of them had paleness on eye, nail and lips respectively. Nearly forty nine, 69, and 66 percent of the tribal girls from Aralam showed paleness on eye, nail and lips respectively. Fifty one and 80

percent of the tribal girls respectively from Aralam and Pulpally area showed hair discoloration. Twenty seven and 21 percent of the nontribal girls and 56 and 53 percent of the tribal girls respectively from Aralam and Pulpally exhibited their hair loss.

- Tribal girls (10-12 years) from Pulpally showed the severe deficit of Energy requirement (-422.5) next to Aralam Tribal girls(-332.5) when compare with nontribal girls. Tribal girls of 13-15 years also suffered from energy scarcity in their daily requirement (-134.3 for Aralam and -599.2 for Pulpally girls). The nontribal girls reached almost near to the protein requirement (-1.5 and -1.71 for the Aralam tribal girls and +6.36 and -4.75 for Pulpally tribal girls). The tribal girls consumed meagre amount of protein (-16.29 and -17.66 for Aralam tribal girls and -22.64 and -29 for Pulpally tribal girls). Pulpally tribal girls had less in fat consumption (-15.62 and19.45). The nontribal girls attained their daily nutrient requirement of energy, protein and fat; whereas the tribal girls struggled a lot to attain their daily nutrient constraint and they were so posterior than the nontribal girls.
- Pulpally tribal girls deficit 533.7 (10-12 years) and 374.0 (13-15 years) to their calcium requirements. Aralam tribal girls deficit 9.9 (10-12years) and 6.4 (13-15years) in their Iron requirement whereas the Pulpally tribal girls (10-12years) and girls of (13-15years) had the same percent (13.3 percent) of deficit. Nearly 6 percent (10-12years) and 6.1 (13-15years) of Zinc deficit among the Aralam girls. A noticed amount of Zinc deficit could be observed among the nontribal girls. That is 4.1 (10-12years) and 4.3 (13-15years) deficit of Zinc among the Aralam nontribal girls and 3.2 (10-12years) and 3.1 (13-15years) deficit of the same among the Pulpally nontribal girls. 36.5 (10-12years) and 58,0 (13-15years) of deficit to Magnesium requirements among tribal girls from Pulpally. Mean mineral intake of nontribal girls (10-12years) were lesser than the same study group. Girls aged between 13 and 15 years attained approximately optimum requirement. Both age category of tribal girls failed to attain the mineral requirement as per the ICMR RDA (2016).
- Aralam tribal girls had a deficit of 1181.9 (10-12years) and 1756.3 (13-15years) in beta-carotene intake and among Pulpally tribal girls it was 2780.7 µg (10-12years) and 1958.1 µg (1315years). Pulpally tribal girls had a deficit of 0.28 µg (10-12years) and 0.46 µg (13-15years) in their Thiamin intake. While there were a negligible

amount of deficit to the same among both of the nontribal girls. Both tribal girls (0.61and 0.5 in Aralam and 0.6 and 0.79 in Pulpally respectively) underwent insufficiency to their riboflavin requirement and Niacin requirement (4.72 and 6.7 in Aralam; and 6.28 and 7.95 in Pulpally). There was an enormous gap between the Vitamin C requirement and consumption among the Pulpally tribal girls (13.26 µg and 11.7 µg). Folate consumption was very insufficient among the Aralam tribal girls (42.47 and 32.39).

- Fifty two and 57 of nontribal girls percent in both the study areas respectively, did not skip any part of the meal or even they tried to skip any meal, the elders in their home tried to convenient them to have the food. Forty one and 39 percent of the selected tribal girls respectively from Aralam and Pulpally, daily skipped at least one meal in a day. This was happened because of the irregularity in their time habituation. Less than 10 percent of the tribal girls had all the meals daily. Majority (51 and 55 percent) of the tribal girls in both study area skipped two meals daily. Nearly 51 and 49 percent of the tribal girls in Aralam and Pulpally skipped their breakfast every day. Tribal girls did not have any daily time table. They got up very late and had no proper breakfast and rushed to school. All the selected girls, including tribals, were given lunch from their schools. Forty one and 46 percent of tribal girls went to bed early and skipped dinner regularly. Tribal girls, especially the family with more members did not have enough food to eat.
- Sixty one and 50 percent of the selected tribal girls refused to have enough water and had less than four glass of water (200ml) daily. Thirty four and 41 percent of the tribal girls of Aralam and Pulpally respectively consumed 5-7 glasses of water daily. Forty one and 27 percent of the nontribal girls consumed 8-10 glasses of water daily. None of the tribal girls consumed more than two liters of water but 36 and 33 percent of the nontribal girls in both study area respectively consumed more than two litters of water daily.
- Cent percent of the nontribal girls in the both the study areas respectively consumed cereal foods and sugar every day. Fifty three and 49 percent of the nontribal girls consumed green leafy vegetables, 35 and 71 percent of the selected girls in both area consumed other vegetables, 52 and 46 percent of the selected girls consumed roots and tubers, 55 and 64 percent of girls consumed fruits, and 51 and 55 of them consumed egg 2-3 days in a week respectively from Aralam and Pulpally area.

Fourteen and 12 percent of them consumed pulses, 13 and eight percent consumed other vegetables and 65 and 70 consumed oils and fats every day. Eleven and six percent of them never consumed pulses, 11 and 13 of them never consumed roots and tubers out of fear of gastric discomfort. Six and three percent of them did not like egg and some of the selected girls had symptoms of food allergies when they ate eggs. Cent percent of the Aralam tribal girls and 60 percent of the Pulpally tribal girls had cereal based foods every day. Fifty two and 65 percent had pulses, 65 and 35 percent had green leafy vegetables, 81 and 60 percent had sugar 2-3 times in a day. Eighty seven and 85 percent had other vegetables, 64 and 39 percent consumed roots and tubers, 49 and 43 percent of them consumed oils, rarely. Sixty five and 67 percent had fruits, 76 and 92 percent consumed egg, 79 and 75 percent of them had meat and fish based on the availability.

- Thirty two and 29 percent of the nontribal girls from Aralam and Pulpally respectively attained the puberty at the age of 12 years, whereas 34 percent of the Aralam tribal girls attained at the age of 13 years and 31 percent the Pulpally tribal girls attained the puberty at the age of 14 years.
- Thirty three and 34 percent of the nontribal girls from Aralam and Pulpally area respectively consumed Fenugreek as such, or fenugreek boiled water during menstruation. They believed that it will be helpful for decrease the menstrual cramps. Thirty four percent of the Aralam tribal girls preferred to have dried Ginger Coffee (Chukku kaappy) during menstruation as a pain reliever. Twenty four and 18 percent of the tribal girls liked to consume boiled balsam leaf water for the relief. It was surprised to notice that 26 and 32 percent of the tribal girls consumed alcohol during menstruation to control body cramps. Fifty four and 49 percent of the nontribal girls and 65 and 43 percent of the tribal girls avoided pine apple and 65 and 45 percent of the nontribal girls and 73 and 72 percent of the tribal girls restricted papaya during menstrual flow due to the fear of abortion in future. Thirty six and 51 percent of the nontribal girls and 24 and 30 percent of the tribal girls restricted citrus fruit and 17 and 39 percent of nontribal girls and 44 and 31 percent of the tribal girls constrained fruits with sour taste (e.g. .Raw Mango) due to the fear of excess blood loss.
- Eighty nine and 81 percent of the nontribal and 97 and 85 percent of tribal girls in both the study areas trusted on peer group for the source of information. Forty three and 48 percent of the nontribal girls and 38 and 36 percent of the girls attained

information from the schools and the teachers. Fifty nine and 60 percent of the nontribal girls achieved their knowledge from Social Medias whereas 45 and 39 percent of the tribal girls looked up on their parents and their family members especially mothers and elders for the information which were needed to practice for the effective personal and reproductive health and hygiene.

- Pre/post menstrual symptoms like tiredness, pain on breast, cramps, feeling of freeze on legs and hands, mood swings and stress before or after the menstrual cycle was found to be severe among 49 and 53 percent of the nontribal and 42 and 39 percent of the tribal girls respectively from Aralam and Pulpally panchayat respectively. Forty eight and 51 percent of the nontribal and 44 and 41 percent of the tribal girls suffered from dysmenorrhea and associated symptoms like severe cramps, stress, depression, and amnesia during menstrual periods. Sixteen and 22 percent of the nontribal girls and 19 and 17 percent of the tribal girls experienced Polymenorrhea (recurrent but uneven episodes of uterine bleeding <21 days). Nearly ten and 13 percent of the nontribal and nine and 9 percent of the tribal girls endured menorrhagia (extreme amount and duration of bleeding but befalling in regular intermission), 20 and 22 percent of the nontribal girls and 25 and 24 percent of the tribal girls tolerated Oligomenorrhea (menstruation occurring with the intermission of more than 35 Days), 29 and 27 percent of the nontribal girls and 22 and 19 percent of the tribal girls had Metrorrhagia (irregular intervals of menstruation and cannot predict the days anyways), and 10 and 12 percent of the nontribal and 10 and 10 percent of the tribal girls had Hypomenorrhea (menstrual period is regular but the amount of blood is very less than normal).
- 93 and 89 percent of the nontribal girls from Aralam and Pulpally respectively preferred the sanitary pad as the menstrual absorbent. Only Very few, eight percent of tribal girls used the sanitary pad at their time of menstruation. Majority of the selected tribal girls did not known and see the sanitary napkin but heard about it from special programs or from television advertisements. Around 60 percent of the nontribal girls were scared to use cloth pad because of its leakage. 92 and 85 percent of the tribal subject used cloth in their menstrual periods and they used and reused it for many times. The distracted results in this study, were 18 percent of the tribal girls from Pulpally area used paper, waste cloth, hay, unused polyester cloths and so on as

their menstrual absorbent and preferred to dip themselves in the river more time to clean their menstrual discharge.

- Fifty six percent of the Aralam tribal girls and 40 percent of the Pulpally tribal girls never dried their menstrual absorbent cloths under the sunlight. Twelve percent of the Aralam tribal girls and 20 percent of the Pulpally tribal girls did not use detergent for washing menstrual cloth. They were thought that the detergent using as unhealthy and it produced itching on the private parts. Eight and 12 percent the tribes never used soap or dried their menstrual absorbent clothes under sunlight and were preferred to wash with water and shade dried the clothes for further usage.
- Nine and six percent of the nontribal girls from Aralam and Pulpally respectively refused to go to school because of their menstrual cramps whereas the main reason for not attending the school among the tribal girls (20 and 52 percent) were the lack of proper menstrual absorbent. Twelve and 18 percent of the tribal girls skipped one or two days and eight and 20 percent skipped three or four days in every month. Fourteen percent of the Pulpally tribal girls skipped nearly five days in a month because of menstrual cramps and lack of proper absorbents.
- Young girls of 10-15 experienced from different types of psychological commotion. Both the tribal and nontribal girls had the problems in equal intensity. Around 75 percent of girls anguished from stress. Ten to 20 percent of the girls experienced depression, in the range of 20-25 percent of tribal and nontribal from Aralam and 25-35 percent of tribal and nontribal girls from Pulpally were suffered from nervousness. Insomnia was uppermost among tribal population i.e. 41 percent in Pulpally and 36 percent in Aralam. Around thirty percent of nontribal in Aralam and 21 percent of nontribal in Pulpally distressed from insomnia.
- Evaluated awareness on nutritional knowledge among the selected girls were in terms of importance of foods, nutrients, health promotion concentrating on mainly for variables that were general knowledge regards nutrients, health promotion, deficiency disorders, prevention, nutrient sources, and healthy life style. The nontribal girls from Pulpally acquired mean score of 7.98 (with a standard deviation of 2.15) than Aralam nontribal girls secured mean score of 7.70 (with a standard deviation of 2.41) whereas Aralam tribal girls secured the mean score of 3.87 (with a standard deviation of 2.28) and Pulpally tribal girls netted the mean score of 3.69 (with the standard deviation of

1.81). There was a significant differences with a p' value 0.00 (significant at one percent level) in the nutritional knowledge level of the tribal and nontribal girls from the same locale whereas there was no significant differences in the nutritional knowledge level between both nontribal girls as well as between the both tribal girls.

- Evaluated the knowledge on reproductive health awareness in to four different variables namely; knowledge on menstruation, menstrual absorbent, hygiene practices, and sexually transmitted diseases. The collected data exposed that nontribal girls from the Pulpally area attained the mean score of 6.51 (with the standard deviation of 3.68) than Aralam nontribal girls secured the mean score of 5.92 (with standard deviation of 3.83). Pulpally tribal girls scored the mean score of 4.72 (with standard deviation of 2.36) and Aralam tribal girls secured the mean score of 4.61 (with standard deviation 2.22). There was a significant difference with p' value 0.00 (significant at one percent level) in the menstrual hygiene awareness level of the tribal and nontribal girls from the same locale whereas there was no significant difference in the reproductive health knowledge level between both nontribal girls as well as between the both tribal girls.
- Raised the nutrition garden among the tribal families of the tribal girls in the experimental group. Provided seeds and seedlings and monitored nutrition garden preparation. Food stuffs which were consumed by the selected tribal subjects were gathered and these were 31 kinds of edible plants, eight types of mushrooms, 11 kinds of fruits, 15 types of tubers, 14 types of fishes and mussels, nine varieties of poultries, and nine types of animals.
- Commonly available edible plants were selected and were [Hygrophila auriculata (Vayal Chulli), Diplazium esculentum (Churuli Chappu), Centella asiatica (Kodakan), Senna tora (Punnara thakara), Alternanthera brasiliana (kaattu Cheera), Leucas zeylanica (Kaashi Thumba), Cassia tora (Vattathakara), and Aalachappu] and these plants used for phytochemical analysis and estimate the nutrient content using FESEM analysis. Aqua and ethanol medium were selected to extract of each plant samples. Alkaloids, terpenoids, phenols, quinines, and so on were presented in all the selected plant samples whereas in water extracts there was a better precipitate. None of the selected plant sample contained sugar content Kattucheera and Thumba

contained flavonoids and sterols. Nutrients like Calcium, Sodium, Potassium, Magnesium, Aluminum, and Iron were identified and assessed elemental distribution.

- There was no significant difference between the height of the experimental group and control group before and after the nutrition intervention among the tribal girls from both study areas. The tribal girls did not reach the reference value for height which should be attained by the age. There was a significant difference at one percent level between the mean weight and BMI of the experimental groups when compared to control groups from both the study areas. The tribal girls suffered from severe malnutrition and had extreme thinness. Even though, the selected tribal girls did not show any sudden change in their nutritional status, amended gradually and gained a better result after one year, whereas the control group did not show any progress in their nutritional status. The results exposed that the nutrition interventions including dietary modifications and nutrition education significantly influenced the experimental groups to increase their weight and BMI during the study period of one year.
- Experimental group had a mean energy intake of 2026.54 Kcal and 1628.82 Kcal in the beginning with the standard deviation of 165.24 and 261.25 in Aralam and Pulpally respectively. After six months there was an improvement in their energy intake with the mean value of 2162.52 Kcal and 2220.54 Kcal respectively with standard deviation 149.67 and 239.99. After one year, the experimental groups reached the standard mark with mean intake of 2311.16 Kcal and 2416.84 Kcal of the selected tribal girls in both Aralam and Pulpally respectively with the standard deviation of 409.11 and 153.61. The selected tribal girls in experimental group had improved their protein consumption of 33.24 g and 22.69 g, from both the study areas of Aralam and Pulpally respectively with the standard deviation of 6.99 and 5.42 respectively and improved to 39.26 g and 38.19 g with a standard deviation of 6.43 and 7.60 after the period of six months of study and then their protein consumption was enhanced to 45.51g and 48.26 g after one year with a standard deviation of 5.62 and 7.03 respectively. Fat intake of the experimental group was 25.93 g and 19.03 g in the beginning of the study with the standard deviation of 4.69 and 3.70 among Aralam and Pulpally respectively. After six months, there was a gradual improvement in their fat consumption by 30.5 g and 30.83 g with the standard deviation of 4.90

and5.32 and after one year, required fat consumption was noted with the mean intake of 35.8 g and 42.78 g with the standard deviation of 3.42 and 5.68 respectively. The experimental group showed significant deviation at one percent level in their energy, protein and fat intake whereas there was not significant difference in their energy, protein and fat intake of the selected girls in the control group.

- There was a significant improvement at one percent level among the both experimental group of girls in their mineral nutrients (Calcium, Iron, Zinc, and Magnesium) and Vitamins (Beta-carotene, Thiamin, Riboflavin, Niacin, Vitamin-C and Folate) intake but there was not any significant deviation among the subjects in the control groups in these aspects.
- Paleness, fatigue and malaise were common for all the subjects in the experimental and control group of both area. Experimental group from the Pulpally area had appreciable reduction in anemic status. Both the experimental groups attained a significant deviation at one percent level in their clinical symptoms of anemia, after the one year of the intervention. It revealed that the nutrition interventions reduced the occurrence of signs and symptoms of anemia among the selected tribal subjects in the experimental group of girls and there was no significant change in the clinical symptoms of anemia among both the control groups in the study areas.
- There was a strong negative association at one percent level between the iron intake and anemia symptoms in both experimental and control group alike. It revealed the fact that, the clinical symptoms of anemia decreased according to increased nutritional intake of iron.
- Both experimental and control group of girls were experienced the clinical symptoms of nutrient deficiencies such as Thiamine, Vitamin A, Vitamin B12, Vitamin C, Biotin (B7), Zinc, Niacin, Riboflavin, Pyridoxine, Calcium, folic acid, Protein, and Essential fatty acid. It was shocked to note that girls from the Pulpally area experienced more symptoms than the Aralam area. Four and eight percent of the selected tribal girls from control and experimental group of Pulpally tribal area had the clinical symptom of Nyctalopia, and ten and 12 percent of the tribal girls had the vision problem of Xerophthalmia, six and eight percent of the tribal girls had Bitot's spot in their conjunctiva. These all are the indication of Vitamin A deficiency. All the clinical symptoms of the vitamin A deficiency reduced in the experimental group except

Bitot's spot. Thirty and 36 percent of the selected tribal girls had dry hair, 48 and 46 percent of the tribal girls had dandruff, 42 and 44 percent of the selected tribal girls had dry and rough skin which were the deficiency of Biotin, zinc, niacin, riboflavin, and pyridoxine respectively. The experimental group of tribal girls showed slight reduction in their occurrence of clinical symptoms of nutritional deficiencies after one year of the study.

- Pre/post menstrual symptoms (PMS) were common among the selected tribal girls. Seventy six percent of the tribal girls from the Aralam experimental group and 78 percent of girls of the control group suffered from the emotional disturbance like downheartedness, nervousness, bad temper and decreased co-ordination. The experimental group showed a favorable change in their emotional imbalance after one year of nutrition intervention. Twenty six girls, out of 50 tribal girls from the Aralam experimental group experienced bloating and 30 percent of girls unconfined from this problem after the study period of one year. Sixty two percent of the girls had a feeling of appetite changes and after one year, 62 percent was reduced to 26 percent and free from this type of gastrointestinal problems.
- Forty six percent of the girls in the experimental girls from Pulpally had lower abdominal cramp and headache associated with menstruation and 16 and 10 percent of the tribal girls had remained the same situation after one year of nutrition intervention. Forty six girls from the same area suffered from fatigue and weakness in the beginning of the study whereas 10 percent of the tribal girls had the same problem even after one year of nutrition intervention. Data cleared that the nutrition intervention was positively influenced the selected experimental girls in the study groups belonged to the both tribal study area to reduce the menstrual problem of dysmenorrhea.
- When considered the menstrual disorders experienced by the selected tribal girls, 22 percent of the selected tribal girls of experimental group from Pulpally experienced menorrhagia in the beginning of the study and eight percent girls absconded from that condition after one year. Twenty two percent of the selected tribal gilrs of experimental group from the Aralam suffering from Oligomenorrhea and 12 percent of girls relieved from this problem after one year. Both control groups remained in the same position before and after the study period.

- Only 14 percent of experimental group of tribal girls from the Aralam had enough sunlight exposure and 44 percent had very less sunlight exposure before the experimental study whereas 98 percent experienced to require sunlight after one year. In Pulpally experimental group, 28 percent had meagre exposure to sunlight in the beginning and 96 percent experienced that the sunlight is required for their health at the end of the study period of one year.
- The tribal girls did not have the habit of adopting daily physical exercises. In the beginning of the study, 78 and 68 percent of the experimental girls from both Aralam and Pulpally respectively did not have the habit of adopting physical exercise but after one year cent percent of the experimental group of selected tribal girls started to do maximum active physical actions with vigorous daily routine activities, and brisk walking. It was noticed that, 70 percent involved in more than one exercise and interested to follow regularity for this healthy life.
- This study revealed that the dysmenorrhea had a strong negative association at one percent level (with p value 0.00) with the sunlight exposure, water intake and exercise. It indicated that the sunlight exposure, water intake and exercise were reduced, the dysmenorrheal discomforts will be increased and vice versa.
- There was a gradual significant improvement at one percent level (p' value 0.00) in the knowledge, attitude and practice level of the both experimental groups during the study period of one year whereas there was not significant changes among the control group. It declared that the nutritional interventions significantly influence the nutritional knowledge, attitude and practices of the selected tribal girls in experimental groups.
- There was a significant gradual development at one percent level (p' value 0.00) in the reproductive health knowledge, attitude and practices of the both experimental groups whereas there was no significant changes among the control groups of the study groups. It confirmed that the nutritional interventions significantly influence the nutritional Knowledge, Attitude, and Practices of the selected tribal girls in experimental groups of the study groups.
- There was a positive association at one percent level (p' value 0.00) between the knowledge and attitude, attitude and practice, and knowledge and attitude. If the

knowledge level increased it will be helped to improve the attitude and this will help to lead the healthy life coupled with nutritional and reproductive health practices.

Tribal population in Kerala suffered from extreme poverty, lack of proper education, unaware of nutritional and reproductive health importance, poor standard of living, and are marginalized form nontribal counterpart. Even though the Kerala State Government implemented many programs for the welfare of the tribal population, the tribal community could not make use of it in proper way. Tribals are the weaker section of the society to raise their voice for they rights. The tribal young girls are the least beneficiaries even from their own community. It was noticed that, tribal young girls were physically, socially and psychologically unsecure segments of the population. This study was a little effort to create aware ness related to the importance of nutritional care among the selected tribal young girls by considering them as future mothers. Make them aware of nutritional sources near to their door steps, instigated the nutrition garden among them, modified their diet by proving nutrition education, guided for then healthy lifestyle pattern, and educated the importance of personal hygiene and reproductive health practices through constant communication and guidance the target tribal group came into aware of their health and started to follow healthy life style pattern. The experimental group of young girls showed their improved knowledge, attitude and practices in the nutritional and reproductive health aspects.

One of the major obstacles to increase the level of malnutrition in India today is to deal with micronutrient deficiency, mainly vitamin A and iron deficiency. Although many strategies have been devised to control these twin problems, the most sustainable and affordable solution for nutritional scientists is to improve the eating habits of population groups. To achieve this, women and families need to be adequately educated on adequate nutrition knowledge, including self-sustaining attitudes and practices, and to be able to choose micronutrient-rich foods as regular foods, which can help to address chronic malnutrition problems. Observations in this microwave level study showed that clinical and subclinical levels of vitamin A and iron deficiency are still a public health concern, especially among young girls of tribal community. This study clearly revealed that the potential of developing a home garden with green leafy vegetables and other wild edible fruits and vegetable which are rich in micronutrients are very much helpful to enhance their micronutrient profile. Investigations have shown that empowering families by educating on

the benefits of these micro nutrient-rich garden products has helped to develop good habits on the following basic principles of nutrition among the selected tribal girls. Iron and other nutrients intake are slowly but steadily improving among the selected subjects and it influenced the nutritional and health status of their family members.

Therefore, there is no doubt that a home gardener's effort to alleviate micronutrient deficiencies from small pockets of society with its multiplicative and repetitive effects is the most sustainable and economical way to promote micronutrient status and to eliminate micronutrient deficiency locally thereby globally. Although limited to a sample size from tribal community, the investigation is warranted for further investigations in other parts of the country. Formulate national government opportunities and specific policies to promote the production and consumption of fruits and vegetables. Achieving a specific action plan requires deeper and longer-term outcomes along with follow-up lines, suggesting the following recommendations:

- More programs should be initiated among the tribal population to improve their nutritional and social awareness
- The government should make some policies to ensure that the Public Distribution Centers (PDC) are properly distribute the 'ration' commodities to the card holders in proper quality and quantity in a systematic manner and ensure the Public Health Centers (PHC) are working properly with adequate numbers of staff members in PDC and PHC.
- Should restrict the alcoholism and should open rehabilitation centers to make them free from unhealthy practices like alcoholism and tobacco usage. The tribals spent their entire earnings towards these unhealthy practices and make the families to be in poverty. This is one of the major reason for their backwardness and their poor nutritional and health status especially in Kerala.
- Promote nutrition garden activities among the tribal population by proving seeds and seedlings at free of cost.
- Improve the existing ICDS food supplementation by including jaggery, green gram, and Vitamin A enriched oils and avail the government programmes to promote nutritional health and prevention of health problems.