**Book series titled “IIPV3EBS15-G24 Futuristic Trends in Medical Sciences” under IIP\***

**Referred by Dr.Rashmi Gupta (Editor Id “IIPER1680934381”)**

**ROLE OF DIET AND LIFESTYLE FACTORS ON GUT MICROBIOTA AND ITS IMPACT ON HUMAN HEALTH.**

Gupta Tulasi1, Gupta Rashmi 2

Ph.D.Scholar1&Associate Professor2 ,Department of shalya Tantra ,Faculty of Ayurveda Institute of Medical Science, Banaras Hindu University ,Varanasi (221005),Uttar Pradesh, India.

**Abstract-** In nutrition science, diet refers as the food and drink that is regularly consumed by an individual (or a group). During the therapy of particular diseases, and management of these diseases proper diet and lifestyle is important and diet may be restricted i.e. one that meets the physical needs of an individual. Diet play a major role in the healthy life .In modern scenario, fast food, fried foods, and most bakery foods, street food are consumed is trends, but this foods are unhealthy and it kills the good bacteria of the intestine and create a barrier in absorption of nutrients .Gut microflora are the very important for the overall health .Healthy lifestyle habits are also important for the digestive health, cardiovascular diseases, and gut health and also improved the quality of life. Dietary fiber is improved the intestinal health and promote the growth of healthy bacteria of the gut.Fermanted foods are the good for intestinal health. plants based diet are the good source of dietry fiber ,minerals rich in vitamins,etc,which is important for the good microbiota health.Polyphenols rich foods ,and probiotic foods are the good for the digestive tract and intestinal health. Overall eating a colorful fruits and vegetables are the promote the good health.

Modern era treating the intestinal diseases and gastrointestinal diseases and digestive diseases etc use of medicine as well as diet and lifestyle is most important part. If accepting a healthy diet and lifestyle, in future almost many diseases are in controlled and come in the fast recovering stage

**KEYWORD- Diet, Lifestyle, Gut Microbiota, polyphenols and probiotic foods, health**

**Introduction-** Gut-microbiota (GM) is considered a hidden metabolic organ of the body1.providing.Gut microbiome or gut flora are the microorganism that lives in the digestive tracts of human body .Complex microbial communities are the integral part of the ecosystem and our bodies in health and diseases1,. Proper nutrition and active lifestyle with restricted calorie is promote the growth of healthy microbiota and its act against the various type of diseases

Micrbiota is defined as “Collection of Microorganism living in defined enviorenment”2. Gut bacteria plays a beneficial role in good health like absorption of nutrients ,integration of vitamin K, help the support of the digestion of cellulose and promoting vascularization and abdominal nerves function3.The gut microbiota produced a variety of nutrients including a short-chain fatty acids,vitamine B and vitamin K4. Many researches have suggested that gut microbiota is plays an beneficial role in modulating possibility of various persistent diseases, such as inflammatory bowel disease IBD, weight gain , type 2 diabetes mellitus, cardiovascular disease CVD, and cancer5. Diet and lifestyle both are important factors if both are bad or not good than they give birth to other diseases3,4,5 .Improper or unhealthy diet is involve in increasing the metabolic diseases, such as overweight, diabetes mellitus and high blood pressure ,GB stone etc.5,.The contribution of dietary factors is fermented by the human gut microbiome.In this review evidence regarding the dietary fiber intake gut microbiota regulation, and modification in human health.

Dietary fiber is a CHO in plant food and legumes, which have been prominent in human diet for several of years6. The all dietary habits involve in good or bad condition of the health such as inflammatory conditions, IBD inflammatory bowel diseases, abnormalities in tissue sclerosis and bone decay.

A modern diet has been linked to the health and it’s capable in promoting the diseases like pro inflammation, and the other hand the conventional dietary pattern that are linked as being contrary to inflammation7. It is show the strong relationship or direct effect of the nutrients on human immunity and body function.

Dietary factors also affect the function of good gut intestinal micro flora, it accordingly affect the immunity. The gut bacteria play a vital role in overall health and disruption to the gut microorganism; have been a many health problem7. In present scenario faulty lifestyle habits like poor sleep, exessesive alcohol consumption restrictive poor diet and inactiveness are harms the gut health.

**Symptoms of an unhealthy gut**

Many parts of modern life can affect gut microbiome, including:

* Hypertension,
* sleep,
* eating processed ,junk food
* drugs

It affects the health such as

* immunity
* Hormones
* other diseases
* Weight8

### 1. Stomach discomfort

It can be signs of an unhealthy gut included-

* bloating ,
* indigestion ,
* dyspepsia
* irritating bowel

A healthy gut will be have the less difficulty to digestion of food and eliminating the waste material.

**2. Refined Sugary diet**

A diet rich in processed food and refined sugars can decrease the amount good bacteria**.**It may increased the inflammation in the body8,9 .

### 3. Weight management-

### Incidentally weight changes may be a sign and symptoms of an unhealthy gut. In Asymmetry of gut health can impair the body’s ability to absorbed a nutrients, regulate blood sugar level, and stored the fat8,9.

Changing in weight may be caused by the malabsorption because of  [intestinal bacterial overgrowth (SIBO)](https://www.healthline.com/health/sibo). On the other hand, weight gain may be the caused by impaired  [insulin sensitivity](https://www.healthline.com/nutrition/insulin-and-insulin-resistance)

### 4. Fatigue and interruption of sleep

An inequality of gut bacteria may be linked to interruption of sleep .Less sleep duration is also causes the fatigue8.

### 5. Skin allergy or diseases-Skin diseases such as psoriasis’ may be related to the bacteria which present in gut10.Small concentration of good bacteria may affect the body immunity

### 6. Organ specific condition- Many researches show the relation between the gut health and immunity, harmfull gut bacteria may increased the swelling and alter the immunity11.

This can lead to the [organ specific diseases](https://www.healthline.com/health/autoimmune-disorders), where the body attacks itself

### 7. Food sensitivity- Food sensitivity is the result of difficulty in digestion of specific food11,12.

* [Food intolerances](https://www.healthline.com/nutrition/common-food-intolerances) are the result of difficulty digesting certain foods11,12. This is different from a [food allergy](https://www.healthline.com/health/allergies/food-allergy-sensitivity-difference), immune system is react the certain or specific type of food like lactose intolerance, it caused by a poor quality of bacteria present in the gut12. Digestive systems are interrupted such as –
* bloating ,
* cramp in abdomen,
* diarrhea

**Improve the gut health with healthy diet and lifestyle**13

Many type of factors, including healthy diet and lifestyle is affect the gut health**.** That is

**Eat healthy varieties of food**-Eating variety of food is promote a good health and decreased the risk of diseases. Keeping the diet interesting with different flavor and texture14.

Food and vegetables are the best sources of the nutrients which promote the healthy micobiome

**High fibrous food which is good for gut microbiota**15**-**

* Raspberries
* Artichokes
* Green pea
* Broccoli
* Lentils
* Beans
* Whole grains
* Apples
* Figs

**Consume fermented food**-Fermented food are the rich sources of lactobacilli bacteria that can promote the good health15,.Fermanted soybean milk is also promote the growth of beneficial bacteria like Bifidobacteria and Lactobacilli15,16 .It decreases the other quantity of harmful bacteria .

**Includes plant based diet-** Plant based diet have developed increasingly across the globe, it used mainly for human health and environmental benefits17. Many researches are identifies the relationship between the plant based diet and decreases the risk of CVD, cardiovascular diseases, obesity, Metabolic diseases, and other health issues.

**Includes food rich in polyphones-**Diet rich in phytochemical represent the wide variety of compounds that include in fruits vegetable,wine,tea,vergin olive oil cocoa products and varieties of chochalates,which is mostly derivatives of flavones catechins and phenolic acids etc and possess a diverse the such properties such as antioxidents,antiapoptosis,anti aging,anti-carcinogen,anti inflammation,antiatherosclorosis improvement the endothelial functionas well as inhibition of cell proliferation activity18.

**Probiotics rich diet-** Due to WHO defines probiotics “live microorganisms which administered in adequate amounts afford a human health benefits on host19. Probiotics are the microorganisms (like lactobacillus and Bifid bacterium) that when consumed (as nutrition supplement) maintains or restores the healthy bacteria to the digestive tract. Few benefits of probiotics20

* Weight loss
* Improved digestion
* Enhance immune system
* To healthier skin
* Reduced the risk of cardiovascular diseases, metabolic diseases etc

Probiotics can help maintain a healthy balance of healthy bacteria in your body. Healthy bacteria support your immunity and help to control inflammation. Adding foods rich in the probiotics to support overall health-

**Diet and lifestyle affect on health and its futuristic trends in medical sciences-** The consumption of fermented foods and probiotics to emerging applications of gut microbiota transplantation, the health benefits of manipulating the human gut microbiota has been exploited for millennia21. Even though this history, present advanced technology are cracking the capacity for targeted the microbial manipulation as an innovative therapeutics.

Gut microbiota is the very important part of the human body .Healthy diet with lots of vegetables and fruits, and such type of polyphenols, and probiotic rich foods are important for the gut health and overall health22.

**Plant-based diets versus conventional diet-** Ordinary or Conventional foods are generally the low in fat and most of them have the some macronutrient composition: 30% fat, 50% CHO and 20% of protein23.

**Vegetarian:** It is also known as the ovo-lactovegetarian, this diet included the all plant-based foods, allowing eggs and dairy products also24.

**Vegan:** This diet that consists of plant-based foods only excluded the meat, dairy, eggs, and honey25. Follows this lifestyle do so for ethical or environmental reasons, and other lifestyle modifications are typically included in addition to the dietary changes.

**Pescatarian:** This is a largely vegetarian diet including sea foods also26.

**Whole-foods, plant-based (WFPB):** Extremely it is similar to a vegan diet; this diet eschews the ethical baggage and focuses on the human health aspect27. High in fruits, vegetables and whole grains which low in fat.

**Flexetarian:** This is a broad term used in vegetarian or plant-based diet, but allow for some meat, dairy, and seafood on occasion28.

**Conventional diet-**Conventional diets are made using the pesticides, chemical herbicides29. At the same time conventional foods seems to carry the chemical residues from the insecticide, rodenticide and other chemical used in the cultivation of the plants ,it is still considered be a safe for the people. Fruits such as the apple, bananas, and citrus fruits cultivate using chemical based farming mathodes30.

**Material and methods-**- Inthis study, all data have been carefully collected from Pubmed, Google scholar. We have been reviewed many research papers on gut microbiota, probiotic diet polyphenols diet. Which is help to improve digestive health and increased healthy gut microbiota. We were Reviewed paper on diet, futuristic trend in medical sciences, healthy lifestyle approach of healthy gut microbiota, to overcome the various types of diseases, and healthy lifestyle. Total 34 articles were reviewed here.

**Discussion –** Consumed photochemical -rich fruits and vegetables, and liquors derived from plants, such as cocoa, red wine and, tea performs the diet beneficial to human health31. Some dietary flavanoids, polyphenols rich foods acquire antioxidative and anti-swelled properties,. These phenol substitutes have the ability to invalidate various biochemical processes activate or caused by the cyst promoters30,31. Some dietary phenol substances also causes narcosis in precancerous or cancerous cells, and suppressed the growth and proliferation of another types of tumor cells via induction of cancerous cell of a specific phase of the cell cycle30. In other words, “gut health” may be a new way of marketing such as weight loss tips, which go hand-in-hand with crazy fad diets32. Rather than counting a calories and drinking green juices to reduce belly fat. The gut micro biome acts a very important role in your gut health by helping the control assimilation of food and beneficial the immune system and many aspects of the health33. Gut is also a body gets rid of metabolic waste and toxins. However, harmful guts, the body will struggle to clear itself of those toxins. If this happens the body produces a various toxins and affects the adverse effect and result is fatigue long term illness swelling throughout the body. Other facts is 70% of resistant cells can found in guts .GUT ASSOCIATED LYMPHOID TISSUE (GALT) and microbiota makes a group ,fight against foreign pathogens which make ill or sick34.

**References-**

1.Khan, I., Yasir, M., I Azhar, E., Kumosani, T., K Barbour, E., Bibi, F., & A Kamal, M. (2014). Implication of gut microbiota in human health. *CNS & Neurological Disorders-Drug Targets (Formerly Current Drug Targets-CNS & Neurological Disorders)*, *13*(8), 1325-1333.

2.Mai, V., & Draganov, P. V. (2009). Recent advances and remaining gaps in our knowledge of associations between gut microbiota and human health. *World journal of gastroenterology: WJG*, *15*(1), 81.

3.Jayachandran, M., Chen, J., Chung, S. S. M., & Xu, B. (2018). A critical review on the impacts of β-glucans on gut microbiota and human health. *The Journal of nutritional biochemistry*, *61*, 101-110.

4.Prakash, S., Tomaro-Duchesneau, C., Saha, S., & Cantor, A. (2011). The gut microbiota and human health with an emphasis on the use of microencapsulated bacterial cells. *Journal of Biomedicine and Biotechnology*, *2011*.

5.Singh, R. K., Chang, H. W., Yan, D. I., Lee, K. M., Ucmak, D., Wong, K., ... & Liao, W. (2017). Influence of diet on the gut microbiome and implications for human health. *Journal of translational medicine*, *15*(1), 1-17.

6.Leeming, E. R., Johnson, A. J., Spector, T. D., & Le Roy, C. I. (2019). Effect of Diet on the Gut Microbiota: Rethinking Intervention Duration. *Nutrients*, *11*(12), 2862. <https://doi.org/10.3390/nu11122862>

7.Jackson, M. A., Verdi, S., Maxan, M. E., Shin, C. M., Zierer, J., Bowyer, R. C. E., Martin, T., Williams, F. M. K., Menni, C., Bell, J. T., Spector, T. D., & Steves, C. J. (2018). Gut microbiota associations with common diseases and prescription medications in a population-based cohort. *Nature communications*, *9*(1), 2655. <https://doi.org/10.1038/s41467-018-05184-7>

8.Edgar, R. C., Haas, B. J., Clemente, J. C., Quince, C., & Knight, R. (2011). UCHIME improves sensitivity and speed of chimera detection. *Bioinformatics (Oxford, England)*, *27*(16), 2194–2200. <https://doi.org/10.1093/bioinformatics/btr381>

9.Zhang, Y. J., Li, S., Gan, R. Y., Zhou, T., Xu, D. P., & Li, H. B. (2015). Impacts of gut bacteria on human health and diseases. *International journal of molecular sciences*, *16*(4), 7493–7519. <https://doi.org/10.3390/ijms16047493>

10.Chen, L., Li, J., Zhu, W., Kuang, Y., Liu, T., Zhang, W., Chen, X., & Peng, C. (2020). Skin and Gut Microbiome in Psoriasis: Gaining Insight Into the Pathophysiology of It and Finding Novel Therapeutic Strategies. *Frontiers in microbiology*, *11*, 589726. <https://doi.org/10.3389/fmicb.2020.589726>

11.Wu, H. J., & Wu, E. (2012). The role of gut microbiota in immune homeostasis -and autoimmunity. *Gut microbes*, *3*(1), 4–14. <https://doi.org/10.4161/gmic.19320>

12.Tuck, C. J., Biesiekierski, J. R., Schmid-Grendelmeier, P., & Pohl, D. (2019). Food Intolerances. *Nutrients*, *11*(7), 1684. https://doi.org/10.3390/nu11071684

13.Jawhara S. Healthy Diet and Lifestyle Improve the Gut Microbiota and Help Combat Fungal Infection. Microorganisms. 2023; 11(6):1556. <https://doi.org/10.3390/microorganisms11061556>

14.Cena, H., & Calder, P. C. (2020). Defining a Healthy Diet: Evidence for The Role of Contemporary Dietary Patterns in Health and Disease. *Nutrients*, *12*(2), 334. <https://doi.org/10.3390/nu12020334>

15.Cronin, P., Joyce, S. A., O'Toole, P. W., & O'Connor, E. M. (2021). Dietary Fibre Modulates the Gut Microbiota. *Nutrients*, *13*(5), 1655. <https://doi.org/10.3390/nu13051655>

16.Leeuwendaal, N. K., Stanton, C., O'Toole, P. W., & Beresford, T. P. (2022). Fermented Foods, Health and the Gut Microbiome. *Nutrients*, *14*(7), 1527. https://doi.org/10.3390/nu14071527

17.Sidhu, S. R. K., Kok, C. W., Kunasegaran, T., & Ramadas, A. (2023). Effect of Plant-Based Diets on Gut Microbiota: A Systematic Review of Interventional Studies. *Nutrients*, *15*(6), 1510. <https://doi.org/10.3390/nu15061510>

18.Han, X., Shen, T., & Lou, H. (2007). Dietary Polyphenols and Their Biological Significance. *International Journal of Molecular Sciences*, *8*(9), 950–988.

19.Kechagia, M., Basoulis, D., Konstantopoulou, S., Dimitriadi, D., Gyftopoulou, K., Skarmoutsou, N., & Fakiri, E. M. (2013). Health benefits of probiotics: a review. *ISRN nutrition*, *2013*, 481651. <https://doi.org/10.5402/2013/481651>

20.Gulliver, E. L., Young, R. B., Chonwerawong, M., D'Adamo, G. L., Thomason, T., Widdop, J. T., Rutten, E. L., Rossetto Marcelino, V., Bryant, R. V., Costello, S. P., O'Brien, C. L., Hold, G. L., Giles, E. M., & Forster, S. C. (2022). Review article: the future of microbiome-based therapeutics. *Alimentary pharmacology & therapeutics*, *56*(2), 192–208. https://doi.org/10.1111/apt.17049

21.van Vollenhoven, R. F., L'ami, M., & Wolbink, G. (2018). Personalised medicine in de reumatologie [Personalised medicine in rheumatology]. *Tijdschrift voor psychiatrie*, *60*(3), 146–150.

22.Gulliver, E. L., Young, R. B., Chonwerawong, M., D'Adamo, G. L., Thomason, T., Widdop, J. T., Rutten, E. L., Rossetto Marcelino, V., Bryant, R. V., Costello, S. P., O'Brien, C. L., Hold, G. L., Giles, E. M., & Forster, S. C. (2022). Review article: the future of microbiome-based therapeutics. *Alimentary pharmacology & therapeutics*, *56*(2), 192–208. <https://doi.org/10.1111/apt.17049>

23.Vigar, V., Myers, S., Oliver, C., Arellano, J., Robinson, S., & Leifert, C. (2019). A Systematic Review of Organic Versus Conventional Food Consumption: Is There a Measurable Benefit on Human Health?. *Nutrients*, *12*(1), 7. <https://doi.org/10.3390/nu12010007>

24. Brantsæter, A. L., Ydersbond, T. A., Hoppin, J. A., Haugen, M., & Meltzer, H. M. (2017). Organic Food in the Diet: Exposure and Health Implications. *Annual review of public health*, *38*, 295–313. <https://doi.org/10.1146/annurev-publhealth-031816-044437>

25.Bakaloudi, D. R., Halloran, A., Rippin, H. L., Oikonomidou, A. C., Dardavesis, T. I., Williams, J., Wickramasinghe, K., Breda, J., & Chourdakis, M. (2021). Intake and adequacy of the vegan diet. A systematic review of the evidence. *Clinical nutrition (Edinburgh, Scotland)*, *40*(5), 3503–3521. <https://doi.org/10.1016/j.clnu.2020.11.035>

26. Bakaloudi, D. R., Halloran, A., Rippin, H. L., Oikonomidou, A. C., Dardavesis, T. I., Williams, J., Wickramasinghe, K., Breda, J., & Chourdakis, M. (2021). Intake and adequacy of the vegan diet. A systematic review of the evidence. *Clinical nutrition (Edinburgh, Scotland)*, *40*(5), 3503–3521. <https://doi.org/10.1016/j.clnu.2020.11.035>

27.Bakaloudi, D. R., Halloran, A., Rippin, H. L., Oikonomidou, A. C., Dardavesis, T. I., Williams, J., Wickramasinghe, K., Breda, J., & Chourdakis, M. (2021). Intake and adequacy of the vegan diet. A systematic review of the evidence. *Clinical nutrition (Edinburgh, Scotland)*, *40*(5), 3503–3521. <https://doi.org/10.1016/j.clnu.2020.11.035>

28. Derbyshire E. J. (2017). Flexitarian Diets and Health: A Review of the Evidence-Based Literature. *Frontiers in nutrition*, *3*, 55. <https://doi.org/10.3389/fnut.2016.00055>

29.Kwiatkowska, I., Olszak, J., Formanowicz, P., & Formanowicz, D. (2023). Dietary Habits and Lifestyle, Including Cardiovascular Risk among Vegetarians and Omnivores during the COVID-19 Pandemic in the Polish Population. *Nutrients*, *15*(2), 442. <https://doi.org/10.3390/nu15020442>

30.Malmir, H., Larijani, B., & Esmaillzadeh, A. (2020). Consumption of milk and dairy products and risk of osteoporosis and hip fracture: a systematic review and Meta-analysis. *Critical reviews in food science and nutrition*, *60*(10), 1722–1737.https://doi.org/10.1080/10408398.2019.1590800

31.Schramm, D. D., Wang, J. F., Holt, R. R., Ensunsa, J. L., Gonsalves, J. L., Lazarus, S. A., Schmitz, H. H., German, J. B., & Keen, C. L. (2001). Chocolate procyanidins decrease the leukotriene-prostacyclin ratio in humans and human aortic endothelial cells. *The American journal of clinical nutrition*, *73*(1), 36–40. <https://doi.org/10.1093/ajcn/73.1.36>

32.Mills, S., Lane, J. A., Smith, G. J., Grimaldi, K. A., Ross, R. P., & Stanton, C. (2019). Precision Nutrition and the Microbiome Part II: Potential Opportunities and Pathways to Commercialisation. *Nutrients*, *11*(7), 1468. <https://doi.org/10.3390/nu11071468>

33.Haro, C., Montes-Borrego, M., Rangel-Zúñiga, O. A., Alcalá-Díaz, J. F., Gómez-Delgado, F., Pérez-Martínez, P., Delgado-Lista, J., Quintana-Navarro, G. M., Tinahones, F. J., Landa, B. B., López-Miranda, J., Camargo, A., & Pérez-Jiménez, F. (2016). Two Healthy Diets Modulate Gut Microbial Community Improving Insulin Sensitivity in a Human Obese Population. *The Journal of clinical endocrinology and metabolism*, *101*(1), 233–242. <https://doi.org/10.1210/jc.2015-3351>

34. Fijan S. (2014). Microorganisms with claimed probiotic properties: an overview of recent literature. *International journal of environmental research and public health*, *11*(5), 4745–4767. https://doi.org/10.3390/ijerph110504745