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THE SKIN MICRO BIOME'S ROLE IN LONG TERM SKIN INFLAMMATORY DISEASES

Jiya Chaudhary

Flower Mound High School School ISD - Lewisville independent school district

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Keywords	*Abstract*
Micro biome, Inflammation, Skin care, Diseases, Hygiene.	The skin, the biggest organ of the human body, executes various functions, including barrier protection, regulation of water and electrolyte balance, hormone synthesis, sensory perception, and antioxidant activity. The skin microbiome is a complex assemblage of microorganisms, encompassing bacteria, archaea, fungi, and viruses. It is affected by environmental elements like temperature, humidity, and sunlight, as well as host characteristics including heredity, age, and immunity. It progresses from a rudimentary form at birth to a sophisticated structure in adulthood, differing by sex and anatomical location. This study examines the potential function of the skin micro biome in chronic inflammatory skin disorders. In this research, we employed quantitative method to gather the data and prepared a survey-based questionnaire and distributed it to selected respondents using random stratified mode to gather the data. The selected sample sizes are 50. Along with this research, the data has been gathered from published papers, online databases and recent research such as PRISMA and PubMed. The findings of the research the skin care products, proper hygiene, lifestyle and diet that help the restoration of skin micro biome balance are effective in improving the health of the skin and the treatment approaches of skin inflammation such as the Probiotic or micro biome enriching skin preparations has the potential for reduce the skin inflammation. And the modulation is an effective strategy to managing the inflammatory skin disorders. The micro biome-focused therapy represents a future direction in dermatological treatment.

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1. INTRODUCTION

The skin, the most significant organ in the human body, executes various functions, including barrier protection, thermoregulation, and maintenance of water and electrolyte balance, vitamin D synthesis, innate immunity, hormone production, sensory perception, and antioxidant activity [1]. The organism's capacity to execute its functions efficiently relies on the existence of many microorganisms, such as bacteria, fungi, parasites, viruses, and archaea. Various microenvironments, such as temperature, age, sebum secretion, and perspiration, affect the microbiome. Ninety percent of individuals possess a "core" symbiotic microbial community [2-3]. Microorganisms specifically adapted to particular environments and displaying unique physiological characteristics reside on the epidermis. Areas rich in sebum support fungal species, including Cutibacterium and Malassezia, while moist habitats accommodate bacteria such as Corynebacterium and Staphylococcus. Proteus, Xanthobacter, and Malassezia populations are present in regions of the epidermis that exhibit dehydration. Microorganisms in the epidermis can influence the host response by engaging with keratinocytes, antimicrobial peptides, lipid-based antimicrobial agents, and cytokines. This step allows the epidermis to preserve its barrier integrity and homeostasis. Bacteria that establish symbiotic relationships with their hosts can inhibit the proliferation of pathogenic bacteria and enhance immune responses [4-5]. This paper offers a thorough examination of the skin micro biome and its involvement in chronic skin diseases. It investigates therapeutic strategies for micro biome modulation, such as lifestyle interventions, antimicrobials, probiotics, and prebiotics. It emphasizes the obstacles and constraints associated with skin microbiome research and explore the potential future applications of micro biome-based interventions in personalized medicine.

Skin Micro-biome Overview

The epidermis microbiome is a multifaceted network of microorganisms, such as bacteria, archaea, fungi, and viruses [6]. It is influenced by host attributes, genetics, age, and immune status, as well as environmental factors such as temperature, humidity, and radiation. It transitions from a straightforward composition at birth to a more intricate one as a result of age, hormonal fluctuations, and the anatomical locations of the body. Sexual dimorphism is readily apparent. The epidermis microbiome is also influenced by hygiene practices, climate, urban or rural living conditions, and exposure to contaminants. The production of antimicrobial peptides and immune processes is influenced by genetic factors and immune responses, which shape the epidermis microbiota [7-8]. It is essential for dermal protection, as it competes with pathogens for resources and space, thereby providing resistance to colonization. Antimicrobial compounds are produced by commensal bacteria on the skin, which increase the defense mechanisms of skin against infections [9], suppress inflammation, and maintain the equilibrium between the skin's immune system and microbiota. It also aids in the metabolism of food by breaking down intricate compounds into basic forms [10-12].

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The Interactions between Healthy Skin and Micro-biome

The surface, epidermis, and dermis are the three layers that make up the skin [Fig-1]. Cell detritus, sebum, and mineral ions from perspiration are utilised by microorganisms to colonise the surface [13].

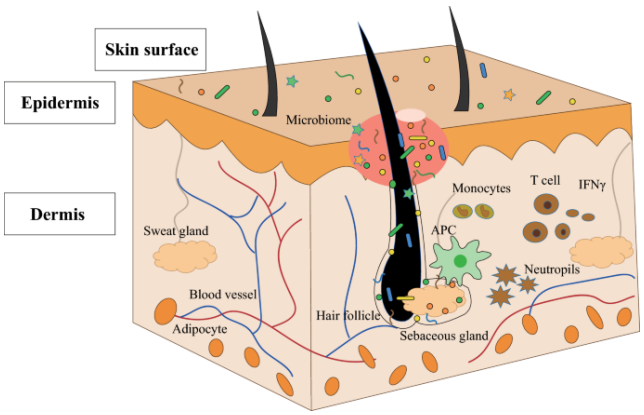

Fig 1: Progress in the human skin micro biome and its implications in dermatological disorders [14]

Staphylococcus species are predominantly found on the skin's surface because they can adapt to heavy salt concentrations and utilise perspiration components as nutrients. Hairs originate from hair follicles and develop from skin fissures [15-17]. Microorganism proliferation and lubrication are facilitated by sebaceous glands. Skin health, pro-inflammatory responses, and immune tolerance are all influenced by the host's microbiome, which is composed of a restricted number of microorganisms. The host's provision of nutrients has an impact on the microbiota. S. epidermidis, a benign organism, is frequently observed on the healthy human epidermis and secretes protective compounds [18-19]. Keratinocytes and host immune responses can be influenced by other species, like Malassezia and Roseomonas mucosa. By metabolising sebum, P. acnes, an anaerobic bacterium, preserves acidic pH of the epidermis. In order to comprehend the mechanisms that sustain healthy skin, it is essential to comprehend the delicate equilibrium between the microbiota and epidermis [20-23].

Influencing Factor of Healthy Skin Microbiome

The microbiome is important for preserving skin health, as it modulates immune responses and supplies vital nutrients. It is a crucial source of antimicrobial peptides (AMPs) that protects the epidermis from pathogenic microbes, therefore inhibiting proliferation and colonization. Antimicrobial peptides (AMPs) are synthesized by commensal bacteria, such as Staphylococcus epidermidis, to safeguard the epidermis against pathogenic bacteria, fungi, and viruses [24]. Competition for resources and space promotes the maintenance of microbial balance and the

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prevention of diseases. The microbiome modulates both innate and adaptive immune responses, facilitating effective reactions to pathogens and promoting immunological tolerance to harmless microorganisms. The maturation of an infant's immune system and the readiness of the epidermis for external factors depend on the initial colonization of the skin by microorganisms [25].

The gut-skin axis notion highlights the interrelationship of microbial populations throughout the body, demonstrating communication between skin health and gut microbiota. Diet and nutrition are determinants that can affect the health of the microbiome by fostering the proliferation of beneficial bacteria on the skin. Moreover, the consumption of fiber-rich meals and the avoidance of excessive sugar intake are both factors that can affect the microbiota. Ultraviolet (UVR) radiation, pollution, and stress can affect the microbial populations present on the skin. Consequently, it is essential to regulate these exposures and uphold a healthy lifestyle to sustain a balanced skin microbiota. Maintaining proper hygiene and utilizing moderate, microbiome-compatible products, while minimizing antimicrobial chemicals, helps preserve a healthy skin microbiome [26].

The Role of Microbiome in Skin Diseases

Acne vulgaris is a chronic inflammatory disorder which is commonly seen in adolescents skin. The condition affects over 85% of adolescents, with 15–20% of cases considered severe. Acne not only causes lasting ugliness but also impedes and harms the hair follicles of teens. Acne is caused by bacteria invading hair follicles, resulting in blemishes, pustules, and nodular cystic lesions. Acne profoundly affects the physical and psychological well-being of adolescents, causing numerous hassles and feelings of inadequacy [27]. Propionibacterium acnes, the sebaceous gland, and follicular keratinocytes are the three principal elements that facilitate the onset of acne. Excessive sebum production by sebaceous glands obstructs hair follicles, creating a restricted, anaerobic environment that induces inflammation. This process fosters an ideal environment for the proliferation of P. acne within hair follicles by elevating androgen and sebum levels, which facilitates their overcolonization. Moreover, certain Malassezia species have been recognized as factors in refractory acne.

S. epidermidis, a commensal skin bacterium, has the ability to ferment glycerol, resulting in the production of short-chain fatty acids (SCFAs) that impede the proliferation of P. acnes. The development of acne is associated with changes in the skin micro biome, which may be the consequence of a discrepancy between P. acnes and S. epidermidis [28-29]. The prevalence of acne is associated with specific strains of P. acnes and S. epidermidis in the microbiome, as demonstrated by omics technologies. These strains may function as biomarkers for the prediction of acne progression and as targets for precise diagnosis and treatment. The cutaneous micro biota of patients with acne grades 1 to 3 is comparable, whereas those with grade 4 exhibit substantial alterations, such as an increase in Gram-negative bacteria and heightened alpha diversity [30-31].

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The pathophysiology of dermatological illnesses is not well understood. The interactions between the host and microbiome appear to significantly influence the pathogenesis of acne, affecting both innate and adaptive immunological homeostasis. Additionally, genetic, dietary, and hygienic factors, along with the immune response, influence acne. The proliferation of P. acnes is currently suppressed through the use of antibiotics [32-33]. It is imperative to understand the micro biota that is associated with acne and to investigate alternative methods for acne management in light of the growing issue of antibiotic resistance in clinical practice.

Functions of Psoriasis, Atopic Dermatitis, Rosacea, and other Dermatological Conditions

Psoriasis, a dermatological illness that is frequently encountered, is characterized by a complicated origin. This etiology includes a variety of factors, both genetic and non-genetic, such as infections, drugs, nutrition, tobacco smoking, and psychological stress. It is believed that cytokines, which include interleukins IL-6, IL-17, and IL-22, as well as interferon, tumor necrosis factor, and other signaling molecules, influence the development of psoriasis through interactions with keratinocytes and both innate and adaptive immune cells. Psoriasis was associated with significant dysbiosis in the skin and gastrointestinal tract in persons [36].

The alpha diversity of the microbiota found in the epidermis is decreased when psoriasis is present. The psoriasis condition, as well as the skin that surrounded it, had an effect on the microbiota of the epidermis, and the impact was comparable. The skin of people with psoriasis showed an increase in the number of Firmicutes, Bacteroidetes, and Streptococcus, as well as a decrease in the number of Actinobacteria and Propionibacterium [37-38].

Following a course of balneotherapy treatment that lasted for three weeks, a clinical improvement was observed in conjunction with the presence of Xanthomonadaceae, a type of Proteobacterium known for its keratolytic properties. The course of psoriasis is beneficially impacted by probiotics that are taken orally. In order to generate molecular signatures that are accurate for the diagnosis of psoriasis, the data from the skin microbiota can be used. The results of strain-level analysis indicated that there is a connection between psoriasis and strain heterogeneity, colonization, and functional variability, which suggests that there is either selection or adaptation of strains that are particular to certain niches [39].

Atopic dermatitis, often known as AD, can be caused by several disorders that are independent of one another but still have some degree of connection. In people who have atopic dermatitis, the barrier function of the epidermis is significantly differ from healthy skin. Dysbiosis of the skin microbiota, which is an imbalance in the types of microorganisms present on the skin, was correlated with increased pathogen colonization and decreased beneficial commensals [40]. The extent to which dysbiosis contributes to the development of atopic dermatitis is still unclear; nevertheless, those who suffer from atopic dermatitis typically have a decreased variety of cutaneous microbiota, with a high prevalence of S. aureus. In some cases, the formation of Staphylococcus aureus (S. aureus) may occur prior to the onset of atopic dermatitis [41]. In a

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particular study, one-year-old infants who had atopic dermatitis (AD) did not show any signs of colonization by Staphylococcus aureus until after symptoms of AD had already started to develop. For this reason, it is of the utmost importance to investigate the association between the number of Staphylococcus bacteria and the symptoms of atopic dermatitis.

The cutaneous microbiota's role in rosacea is under-researched because most studies focus on Demodex mites. It is highly probable that these ectoparasites are not the sole factor contributing to the progression of rosacea. Demodex is not affected by antibiotic treatment, although the majority of rosacea patients respond favorably to this treatment. Consequently, bacteria may be a substantial pathogenic factor. In a variety of therapeutic contexts, systemic antibiotics are frequently employed to address pustules and papules that are linked to rosacea. The natural colonization of Staphylococcus aureus (S. aureus) and Corynebacterium bovis (C. bovis) in eczematous dermatitis induced inflammation, as demonstrated by a comparative analysis of the cutaneous micro biota in rosacea prior to and following the use of oral antibiotics [42-43].

2. LITERATURE REVIEW

This section assesses and discusses recent studies that are pertinent to the research title. This subsection serves to contextualize the study, identify knowledge deficits, and establish a strong foundation for future research.

Kim, H. B., (2025) found that pruritus, eczematous lesions, and reduced skin barrier function are hallmarks of atopic dermatitis (AD), a chronic inflammatory skin condition affecting children and adults. Atopic dermatitis is characterized by skin microbiome dysbiosis, which reduces microbial diversity and increases Staphylococcus aureus. S. aureus causes recurrent infections and illness exacerbations, worsening immunological dysregulation and epidermal barrier integrity. Commensal bacteria like Roseomonas mucosa and Staphylococcus epidermidis may protect against S. aureus colonization by regulating immune responses. Microbial composition and metabolites significantly impact Alzheimer's disease etiology. Bacterial metabolites, such as short-chain fatty acids, indole derivatives, and others, affect skin barrier integrity, lipid metabolism, and cutaneous immunology. Reduced beneficial microbial metabolites are linked to Alzheimer's disease severity and progression. Lipid metabolism issues are connected to increased S. aureus development, which compromises the skin barrier. This paper explores microbiome-targeted therapies' therapeutic potential and the newest research on microbial metabolites and Alzheimer's disease pathogenesis. Topical microbiome transplantation, probiotics, and prebiotics try to balance metabolite synthesis and restore microbial diversity to improve Alzheimer's disease outcomes. New Alzheimer's disease treatments may target beneficial bacteria's metabolites.

Ferček, I., et al. (2021) observed that many common chronic inflammatory skin illnesses, including seborrhoeic dermatitis, rosacea, acne, and conditions affecting the perioral, periorificial, and periocular areas, impact the face and diminish patients' appearance and quality of life. These disorders are difficult to treat due to their unknown pathophysiology and several variables. The

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"microbiome" includes microorganisms (microbiota), their genomes, and environmental variables in a specific setting. Changes in the types and functions of bacteria on human skin can lead to problems with the immune system and inflammation, which might influence the symptoms and treatment of different disorders. Traditional cultivation methods have been employed to study bacterial microbiome species; however, many strains cannot be cultivated in the lab. Metagenomic approaches can discover bacteria that cannot be grown, as culture-dependent methods detect less than 1% of all bacterial species. The skin microbiome is spatially distributed by the microenvironment (sebaceous, wet, dry). Although disruption of the skin microbiome can induce a range of pathological disorders and diseases, it is unclear whether skin diseases cause or result from microbiome alterations. To date, the skin microbiome has been examined in atopic, seborrhoeic, psoriasis, acne, and rosacea. Research on microbiome alterations and skin illnesses has improved disease genesis, diagnosis, and treatment. The discovery of bacterial indicators linked with certain inflammatory skin disorders will speed diagnosis and lower treatment costs. Microbiota study and determination might help identify skin disease reasons that simpler approaches cannot discover, leading to more effective treatments.

Kim, S., et al. (2025) observed that many common chronic inflammatory skin illnesses, such as seborrhoeic dermatitis, rosacea, acne, and conditions affecting the perioral, periorificial, and periocular areas, negatively impact facial appearance and diminish the quality of life for patients. These disorders are difficult to treat due to their unknown pathophysiology and several variables. The "microbiome" includes microorganisms (microbiota), their genomes, and environmental variables in a specific setting. Changes in the types and functions of bacteria on human skin can lead to problems with the immune system and inflammation, which might influence the symptoms and treatment of different disorders. Traditional cultivation methods have been employed to study bacterial microbiome species; however, many strains cannot be cultivated in the lab. Metagenomic approaches can discover bacteria that cannot be grown, as culture-dependent methods detect less than 1% of all bacterial species. The skin microbiome is spatially distributed by the microenvironment (sebaceous, wet, dry). Although disruption of the skin microbiome can induce a range of pathological disorders and diseases, it is unclear whether skin diseases cause or result from microbiome alterations. To date, the skin microbiome has been examined in atopic, seborrhoeic, psoriasis, acne, and rosacea. Research on microbiome alterations and skin illnesses has improved disease genesis, diagnosis, and treatment. The discovery of bacterial indicators linked with certain inflammatory skin disorders will speed diagnosis and lower treatment costs. Microbiota study and determination might help identify skin disease reasons that simpler approaches cannot discover, leading to more effective treatments.

Beri, K. (2018) observed recent advancements in our comprehension of skin function and its microbiome have shown a robust symbiotic link between skin microbiota and host immunological processes. Dysbiosis, or the imbalance of the microbiome, along with other variables affecting surface microbiota, can impact keratinocyte regulation, homeostasis, and skin barrier function.

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This article looks at the research connecting the skin microbiota to how well the outer layer of skin works and explores future opportunities to use this relationship to develop new cosmetics and skin medications for health and beauty.

Prescott, S. L., et al. (2017) revealed that human health is contingent upon the construction and function of the skin barrier. The unrecognized functions of epidermal keratinocytes indicate that the skin is essential for modulating the body's physiology in response to changing conditions. This function encompasses the skin's capacity to generate various hormones, neurotransmitters, and cytokines that can affect emotions and general physiological states. The skin microbiome strongly influences host immunological networks and the growth and homeostatic regulation of keratinocytes, exerting systemic consequences. The diversity of ecosystems in which they reside profoundly influences the biodiversity of skin habitats, which constitute our primary interface with the external environment. Consequently, factors that alter the makeup and health of the skin microbiota may increase individuals' susceptibility to inflammatory non-communicable diseases (NCDs) as well as dermatological conditions. With advancing age, psoriasis, rosacea, acne vulgaris, and allergic conditions, including eczema and food allergies, have been associated with disturbances in the stratum corneum. The micro-ecological variety, encompassing our microbial ecosystems, is diminishing due to the constructed environment, global biodiversity declines, and less natural connectivity. This trend underscores the importance of ecological perspectives in addressing the origins of dysbiosis and the lifelong risk of inflammatory diseases.

Yang, Y., et al. (2022) emphasized that the skin is the body's principal organ and that environmental variables cause psoriasis, atopic dermatitis, and acne. The skin's microbiota regulates its function as the immune system's major protection against pathogens, and prevents disease. Many commensal microorganisms colonize human skin, altering its environment and creating a tough niche for bacteria. Dysbiosis and imbalance in the skin microbiome affect human health and skin diseases. This study discusses growing knowledge of the skin microbiota and human skin. They also discuss microbiota's potential effects on skin health and diseases, focusing on a few species. They evaluated probiotics, prebiotics, healthy diets, and lifestyle choices for preventing, diagnosing, and treating microbe-caused skin disorders. Synthetic biology can change skin microbiota to maximize interactions. This review clarified the recovery of human skin microbiota, the relationship between disorders and it, and the methods for designing or rebuilding it.

Sanchez-Lopez, M. F., et al. (2025) investigated the efficacy of microbiome dysbiosis treatments and the influence of skin and gut microbiota dysbiosis on inflammatory skin illnesses. Understanding this bidirectional relationship is essential, as the gut-skin axis connects these diseases through immunological and neuroendocrine pathways. Actinobacteria were less prevalent in the gut microbiome of psoriasis patients, while Firmicutes were more prevalent, suggesting a higher level of inflammation. Low populations of Bifidobacterium and Lactobacillus were associated with the severity and frequency of atopic dermatitis flare-ups. Probiotic therapy was

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discovered to increase microbial diversity and reduce inflammation in inflammatory skin diseases. The results indicate that the treatment of these disorders necessitates the presence of microbial dysbiosis. Therefore, further controlled trials are necessary to validate the long-term effectiveness and mechanisms of microbiota-targeted therapies.

Martins-Green, M., et al. (2025) discovered that wound healing is a complex process with multiple phases, each defined by distinct occurrences in relation to time and location. If these procedures are improperly conducted, biofilm-forming bacteria may infiltrate the healing tissue, particularly in patients with comorbidities. As a result, the lesions do not heal and become chronic. This review examines the importance of heightened oxidative stress (OS) levels and skin microbiome bacteria in the onset and progression of chronic ulcers. The microenvironment in particular body locations affects the composition of the diverse human epidermal microbiome. The operating system (OS) is crucial for wound healing, as it activates the immune system to eradicate infections and release cytokines and growth factors that facilitate healing. Chronicity arises when the wound's oxidative stress levels increase and the skin's microbiota colonize the area. Nonetheless, chronicity cannot be instigated solely by either oxidative stress or the epidermal microbes independently. However, persistent lesions occur when both factors are present. The advancement of a treatment for these wounds has been difficult due to the complexity of chronic wound onset. This section also discusses the challenges related to chronic wound therapy and proposes a potential treatment sequence following debridement.

3. OBJECTIVES

This research has several following objectives:

- To identify the characterstics of skin microbiome
- To assess the role of skin microbiome in chronic inflammatory disease

4. METHODOLODY

This study concentrates on the function of the skin microbiome in chronic inflammatory skin disease. Throughout this research, in the primary data, we employed quantitative method to gather the data and interpret the results. We prepared a survey-based questionnaire and distributed it to selected respondents using random stratified mode to gather the data from Patients. The selected sample sizes are 50. Along with this research, the data has been gathered from published papers, articles, government reports, online databases and recent research such as PRISMA and PubMed.

Primary Source: The primary data employs quantitative methods where the data have been collected through survey by distributing questionnaires to the selected respondents. The total selected respondents are 50. For this research we are using random sampling techniques and analysing the data using Excel to derive results.

Secondary Source: In secondary source of data, we have collected the data from published papers, articles, government reports, online databases and recent research such as PRISMA and PubMed etc.

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5. RESULTS AND DISCUSSION

In the results section, we adhered to the methodology outlined above, collecting data from respondents. We analysed and interpreted the data as described below to derive the results through Excel Software.

TABLE 5.1. DEMOGRAPHIC VARIABLE

AGE	FREQUENCY	PERCENT
16-20	12	24%
21-25	16	32%
26-30	13	26%
30 Above	11	22%
GENDER		
Male	23	46%
Female	27	54%
EDUCATION		
High school	6	12%
Graduation	25	50%
Post- graduation	19	38%
MARITAL STATUS		
Married	23	46%
Unmarried	17	34%
Divorce	10	20%
OCCUPATION		
Employee	14	28%
Student/ Unemployed	7	14%
Self employed	11	22%
Entrepreneur	18	36%
LIVING LOCATION		
Urban	26	52%
Rural	24	48%
HAVING HEALTH INSURANCE		
Yes	31	62%
No	19	38%

The above table 5.1. Describes about the demographic variables of the respondents, There are 50 respondents that are selected in this research. The respondents category are divided into 2 group: 1]

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Male 2] Female. Among these respondents there are 23 male respondents along with 27 respondents are female. The category of respondent's age divided into 4 groups where there are 24% respondents are lies on age 16-20 and 32% respondents are lies in 21-25 and 26% respondents are lies in between 26-30 age group and lastly, 22% respondents are lies 30 above age category. The education background of these respondents are categorised into high school, graduation and post-graduation. Among these respondents, 12% of respondents are high school pass out, along with 50% respondents are graduated and lastly, 38% respondents are post-graduated. Among these respondents there are 46% of respondents are married and 34% of respondents are unmarried along with 20% of respondents are divorcee. The respondents are comes from several occupational belongings such as 28% of respondents which are employed along with 14% of respondents are student/unemployed and 22% of respondents are self-employed and lastly 36% of respondents belongs to entrepreneurial sector. Therefore the respondents are coming from different living location, primarily there are 52 respondents are belongs to urban location along with 48 respondents are belong to rural location. Among these respondents, 62 percent of respondents registered or having a health insurance along with 38 percent of respondents haven't health insurance.

TABLE 5.2. AWARENESS AND KNOWLEGDE ABOUT SKIN-MICROBIOME

In this section, we analysed the awareness and knowledge of skin micro-biome in below table with certain questions.

AWARENESS AND KNOWLEGDE	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
The skin contains a natural collection of microorganisms known as the micro biome.	12	23	10	4	1
The skin micro biome contributes significantly to healthy skin.	13	22	6	9	5
Abnormality of the skin micro biome has been associated with chronic skin inflammation.	7	18	10	4	11
The concept of micro biome imbalance (dysbiosis) is applicable to dermatological diseases.	12	32	1	4	1
Healthcare professionals play an important role in making the general population aware of the skin micro biome.	11	15	14	10	0

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The above table 5.2 represent about the awareness and knowledge about skin microbiome. In the skin contains a natural collection of microorganisms known as the micro biome. With this statement, Among these respondents, there are 12 respondents which is strongly agree with the awareness, 23 respondents are agree with this statements and 10 respondents are neutral along with 4 respondents are disagree and lastly 1 respondent is strongly disagree. In terms of the skin micro biome contributes significantly to healthy skin. With this statement, there are 13 respondents which shows strongly agree and 22 respondents are agree with this statement along with 6 respondents shows that they are neutral and among these respondents 9 respondents are disagree and lastly 5 respondents are strongly disagree. The abnormality of the skin micro-biome has been associated with chronic skin inflammation, with this statement, there are 7 respondents which shows strongly agree and 18n respondents are agree with this statement along with 10 respondents shows that they are neutral and among these respondents there are 4 respondents that are disagree and lastly 11 respondents are strongly disagree. The concept of micro-biome imbalance is applicable to dermatological diseases. With this statement among the total respondents, there are 12 respondents that are strongly agree and 32 respondents are agree and 1 respondent are neutral and 4 respondents are disagree lastly 1 respondent is strongly disagree. In the terms of Healthcare professionals play an important role in making the general population aware of the skin micro-biome, With this statement, there are 11 respondent which shows strongly disagree and 15 respondents are agree along with 14 respondents are neutral and lastly 10 respondents are disagree.

TABLE 5.3. PERCEPTION OF SKIN MICROBIOME AND INFLAMMATION

In this section, we analysed the perception of skin microbiome and inflammation among respondents in below table with certain questions.

PERCEPTION OF SKIN MICROBIOME AND INFLAMMATION	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Skin care products that target the restoration of skin micro biome balance are effective in improving the health of the skin.	14	22	9	3	2
Excessive use of antibacterial soap and sanitizers is a factor of skin micro biome imbalance.	19	13	11	2	5
Excessive or prolonged use of antibiotics is harmful to the skin micro biome.	18	16	7	5	4

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Proper hygiene and skin care are contributing factors to having an optimal skin micro biome.	14	25	6	4	1
Lifestyle and diet are deciding factors in the composition of skin micro biome and skin health	19	20	8	1	2

The above table 5.3 represent the perception of skin microbiome and inflammation. In the terms of Skin care products that target the restoration of skin micro-biome balance are effective in improving the health of the skin. With this statement, Among these respondents, there are 14 respondents which is strongly agree with the awareness, 22 respondents are agree with this statements and 9 respondents are neutral along with 3 respondents are disagree and lastly 2 respondent is strongly disagree. In terms of an excessive use of antibacterial soap and sanitizers is a factor of skin micro biome imbalance. With this statement, there are 19 respondents which shows strongly agree and 13 respondents are agree with this statement along with 11 respondents shows that they are neutral and among these respondents 2 respondents are disagree and lastly 5 respondents are strongly disagree. In the terms of an excessive or prolonged use of antibiotics is harmful to the skin micro-biome. With this statement, there are 18 respondents which shows strongly agree and 16 respondents are agree with this statement along with 7 respondents shows that they are neutral and among these respondents there are 5 respondents that are disagree and lastly 4 respondents are strongly disagree. In the terms the Proper hygiene and skin care are contributing factors to having an optimal skin micro biome. With this statement among the total respondents, there are 14 respondents that are strongly agree and 25 respondents are agree and 6 respondent are neutral and 4 respondents are disagree lastly 1 respondent is strongly disagree. In the terms of the Lifestyle and diet are deciding factors in the composition of skin microbiome and skin health. With this statement, there are 19 respondent which shows strongly agree and 20 respondents are agree along with 8 respondents are neutral and 1 respondents is disagree with this statement and lastly 2 respondents are strongly disagree.

TABLE 5.4. TREATMENT AND MANAGEMENT APPROACHES

In this section, we analysed the treatment and management approaches in below table with certain questions.

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TREATMENT AND MANAGEMENT APPROACHES	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Probiotic or micro-biome-enriching skin preparations hold potential for reduction of skin inflammation.	18	16	9	7	0
Modulation of the skin micro-biome can manage chronic inflammatory skin disorders.	16	22	4	6	2
Micro-biome-focused therapy is a future perspective of dermatological treatment.	23	17	2	4	4
Incorporation of micro-biome science into clinical dermatology will increase the effectiveness of treatment	21	18	6	2	2

The above table 5.4 represent about the awareness and knowledge about skin microbiome. In the Probiotic or micro-biome-enriching skin preparations hold potential for reduction of skin inflammation. With this statement, Among these respondents, there are 18 respondents which is strongly agree with the awareness, 16 respondents are agree with this statements and 9 respondents are neutral and lastly 7 respondent are disagree. In terms of the modulation of the skin micro-biome can manage chronic inflammatory skin disorders. With this statement, there are 16 respondents which shows strongly agree and 22 respondents are agree with this statement along with 4 respondents shows that they are neutral and among these respondents there are 6 respondents that are disagree and lastly 2 respondents are strongly disagree.Micro-biome-focused therapy is a future perspective of dermatological treatment. With this statement among the total respondents, there are 23 respondents that are strongly agree and 17 respondents are agree and 2 respondent are neutral and 4 respondents are disagree lastly 4 respondent is strongly disagree. In the terms of incorporation of micro-biome science into clinical dermatology will increase the effectiveness of treatment. With this statement, there are 21 respondent which shows strongly disagree and 18 respondents are agree along with 6 respondents are neutral along with 2 respondents are disagree with this statement and lastly 4 respondents are disagreed

6. CONCLUSION

We conclude that the majorly participants have knowledge about the existence of the skin micro biome and its contribution to maintain healthy skin along with the concept of imbalance of skin micro biome is applicable to dermatological diseases. The excessive use of soap and sanitizers play

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a major role to micro biome imbalance. It was also observed that the skin care products, proper hygiene, lifestyle and diet that help the restoration of skin micro biome balance are effective in improving the health of the skin. Furthermore, the treatment approaches of skin inflammation such as the Probiotic or micro biome enriching skin preparations has the potential for reduce the skin inflammation. As well as modulation is an effective strategy to managing the inflammatory skin disorders. The micro biome-focused therapy represents a future direction in dermatological treatment and that integrating micro biome science into clinical practice would enhance treatment effectiveness.

7. AUTHOR(S) CONTRIBUTION

The writers affirm that they have no connections to, or engagement with, any group or body that provides financial or non-financial assistance for the topics or resources covered in this manuscript.

8. CONFLICTS OF INTEREST

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

9. PLAGIARISM POLICY

All authors declare that any kind of violation of plagiarism, copyright and ethical matters will take care by all authors. Journal and editors are not liable for aforesaid matters.

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