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POTENTIAL TOXICITY OF ALPHA AND BETA HYDROXY ACIDS IN COSMETIC PRODUCTS: A REVIEW

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ABSTRACT

Hydroxy acids have a significant role in various therapeutic circumstances, most notably in the cosmetics business. Despite its importance in treating acne, scars, pigmentation, skin dryness, and wrinkles, among other skin disorders, AHAs and BHAs have substantial side effects, such as increased photosensitivity. In today's market, these products are becoming increasingly popular due to the promise of quick whitening benefits, which causes worry in the pharmaceutical cosmetics business. As a result, this analysis intends to provide a larger perspective on the AHA-BHA, its current state within the healthcare sector, various linked cosmetics goods with FDA warnings, and related themes from the past to the present. The review resurrects founded papers in order to better comprehend the condition of AHA-BHA, acknowledge its subsisting role in the pharmaceutical industry, and comprehend the potential toxicity brought by AHA-BHA in order to pique readers' interest in using cosmetic products containing AHA-BHA with caution.

Keywords: *Alpha-Hydroxy Acids, Beta-Hydroxy Acids, Potential Toxicity, Cosmetics*

1. INTRODUCTION

For more than decades, pharmaceutical cosmetic formulations have been recognized over time due to their wide application and therapeutic uses in humans, particularly on the skin. Primarily, there are a lot of ingredients used by the manufacturers to produce quality cosmetic products in the market that are generated either synthetically or naturally. Hydroxy Acids are one component that has several skin benefits. In particular, the most prominent used classes of these known compounds are the Alpha-Hydroxy Acids or AHAs and the Beta- Hydroxy Acids or BHAs [1]. AHAs are water-soluble acids that naturally consist of organic carboxylic acids and are substituted for the presence of the hydroxyl group on the α carbon atom. As occurring naturally, they are mostly found in botanical substances such as fruits [2,3]. These include the following such as lactic acid which comes from fermented milk products and tomato juice, citric acids, citrus fruit, mandelic acids (almonds), tartaric acids (fermented grapes), ascorbic acids (fruits), malic acids (apple), and lastly, the glycolic acid (sugarcane) and is one of the popular and the first AHA that is being introduced as one of the ingredients in skin care products due to its best anti-aging effects [1,2]. BHAs, on the other hand, are lipid-soluble compounds with hydroxyl functional groups separated by two carbon atoms and connected to the carboxyl group's beta position [3]. Salicylic acid, produced from willow bark, is commonly used in cosmetics to cure acne, reduce wrinkles, and improve complexion without affecting the skin when mixed with AHAs [4,5]. Also, certain BHAs are AHAs because they have hydroxyl groups connected to distinct carboxyl groups like the alpha-position and beta-position [1,3]. Thus, more recently, the pharmaceutical and the cosmetic industry significantly used and appeared both of these compounds as ingredients in any skincare cosmetic products as they believe that it enhances and produces therapeutic effects and as well as provide consumers perceivable benefits [6]. AHA-containing skincare products were linked to 114 adverse dermatologic reactions between 1992 and February 2004, with the largest incidence in 1994 [7]. Moreover, there have been cosmetic products that possessed toxicity risks associated with AHA-BHA content. The review reexamines the AHA-BHA and its potential toxicity to the skin and to the body.

2. MATERIALS AND METHODS

This article review draws on retrieved research and peer-reviewed papers from several journal databases such as Pubmed, Google Scholar, and Research Gate. It also includes updated data from the United States Food and Drug Administration (FDA), RxList, and other scholarly sources. The search began in February 2021 with a direct focus on an overview of AHAs and BHAs, their individual roles and functions in the biological system, potential toxicity, characteristic and physiologic difference665s, pharmaceutical concerns in the healthcare and cosmetic industries, and products containing AHA-BHA to be aware of.

3. BRIEF OVERVIEW OF AHA-BHA

Hydroxy acids are known to be organic chemical compounds containing one or more hydroxyl groups and a carboxylic acid group. Naturally, these acids commonly occur in sugarcane, apple, sour milk, honey, cucumber, lemon, grape, and other foods. Fruit acids are also hydroxy acids that are primarily found in fruits. There are also hydroxy acids, polyhydroxy acids, polyhydroxy bionic acids, and aromatic hydroxy acids included in skincare products. Glycolic and lactic acids contain hydroxyl groups connected to alpha carbon [1]. Also, whenever the hydroxyl group is connected to the beta carbon, the acid is classed as beta-hydroxy acids. It is a fact that the capacity of hydroxy acids to permeate the skin is dependent on the size of the molecule. Apparently, polyhydroxy acids are hydroxy acids that comprise smaller molecules that can penetrate deeper into the skin, causing exfoliation of deeper layers, resulting in serious consequences, such as increased photosensitivity [8].

The two primary hydroxy acid classes are AHA and BHA. Acne, scars, pigmentation, dry skin, and wrinkles are treated with AHA. They're involved in the Krebs cycle, glycolysis, and serine formation. AHA also influences the epidermis and dermis of the skin [2]. Moreover, Salicylic acid and other beta hydroxy acids (BHAs) are remarkably similar to AHAs, with the exception of their solubility. In contrast, AHAs are water-soluble. This structure helps them to penetrate greasy skins and porous comedone. While anti-inflammatory, BHAs (such as salicylic acid) have been shown to be less irritating to the skin when compared to AHAs. The beta-hydroxy acid content in skincare products should be 1-2% [9].

3.1. Alpha-hydroxy acids (AHA)

These acids are natural substances that have hydroxyl groups next to the carboxylic acid group on the carbon [10]. In general, Sour milk (lactic acid), sugar cane (glycolic acid), apples (malic acid), grapes (tartaric acid), Citrus fruits (citric acid), and other foods include them [11]. Predominantly, lactic acid and glycolic acid are commonly used specifically in cosmetic products [10]. They are widely utilized as keratolytic that are used to treat keratinization disorders as well as improve the appearance of photoaged skin and acne [12].

AHAs could have a significant impact when it comes to keratinization diseases as both Yu and Van Scott proposed in 1974. AHAs are known to be safe and effective for peeling all types of skin. Just above the granular layer, corneocyte cohesiveness is reduced by AHAs, which results in detaching and desquamating the stratum corneum [13]. The majority of AHA-containing treatments are "leave on" or "discontinuous use" solutions, which are applied to the skin for a brief time (e.g., less than an hour) and then fully rinsed [10]. However, in the years 1989 to 2004, the FDA received approximately 119 customer complaints about serious dermatologic reactions to a range of cosmetic skincare products advertised as having AHAs. The reported dermatologic reactions are burning, swelling, rash, change in skin pigmentation, blisters, skin peeling, itching and irritation, chemical burns, and increased photosensitivity [10].

3.2. Beta Hydroxy Acids (BHAs)

Most organic acids, such as these acids, are commonly found in beauty products and are used in chemical exfoliation to treat aging, acne, and psoriasis. BHAs, unlike AHAs, are lipid-based rather than water-based, allowing them to permeate the skin through follicles and aid in pore exfoliation [14]. BHAs are particularly beneficial in the treatment of oily skin, clogged pores, and acne because of this characteristic. BHAs are also known to aid improve skin barrier function, increase skin thickness, and boost collagen synthesis via having anti-inflammatory and anti-bacterial characteristics. Salicylic acid, a naturally occurring molecule obtained from willow plants, is the most often used BHA in cosmetics [14]. Apart from that, BHA is a chemically synthesized antioxidant used to keep foods like waxes, shortenings, and fats fresh, according to the European Food Safety Authority [15].

These acids are found in sweet birch bark, willow tree bark, and wintergreen leaves [16]. Hydroxy acids have been used in numerous skincare formulations such as exfoliants, creams for anti-acne, anti-pigmentation, and anti-aging based on their properties for the treatment of various skin disorders such as dryness of skin, acne, hyperpigmentation, and aging skin [17]. Some hydroxy acids can be utilized as photoprotective agents in sunscreens to protect the skin from UV rays [17]. The oil-soluble nature of BHA (Salicylic Acid) allows it to enter into pores and decongest deep-seated oil and debris. Thus, antibacterial and anti-inflammatory effects are also present. BHAs are fantastic for oily or acne-prone skin. This is especially beneficial for persons with sensitive skin and people of color.

4. THE ROLE OF AHAS IN SKIN CELL BIOLOGICAL RESPONSES

4.1. AHAs' Efficacy

For centuries, these acids have been utilized as exfoliants and this family of acids is derived from fruits such as citrus, apples, grapes, and sugar canes. In the skincare regimen, AHA has improved the penetration of other products such as tretinoin and hydroquinone as it breaks keratinocyte adhesion in the epidermis specifically in the stratum corneum. Due to this, it leaves the skin smooth and effective against acne [18].

Apparently, the concentration and exposure period of AHA determine its efficacy [13]. AHA-containing creams have a deeper penetration in skin compared to AHA-containing solutions. Studies confirmed that AHA increases photosensitivity in both UVA and UVB. Participants' susceptibility to UV-induced skin reddening rose by 18% after 4 weeks of administering AHA. Other than that, the participants' vulnerability to UV-induced oxidative stress usually increased by a factor of two on average and a significant individual variation [7]. However, this sensitivity is reversible after discontinuing the use of the product.

Some clinical studies also explored how glycolic acid (GA) affects particularly the increase in photosensitivity of AHA users. One study found that applying 10% GA to the skin for twelve weeks increased skin irritation to Ultraviolet rays and increased the production of sunburn cells (SBCs) [13]. This means that the use of AHA-containing products requires caution of usage.

4.2. The Safety of AHA

Human clinical trials were conducted to assess the safety of AHA in cosmetics. Reports on increased photosensitivity that results in easy skin sunburn have led the FDA to investigate such adverse reactions. The formation of sunburn cells (SBC) and variations in the minimal erythema dosage (MED) were studied in human clinical trials. As a result, the MED represents the smallest amount of Ultraviolet light required to cause skin reddening. The production of SBCs and erythema (reddening of the skin) are both signs of sunburn. UV-induced cyclo-pyrimidine dimer (CPD) production, a kind of DNA damage, was also observed in the investigations [7].

The effects of topical application of glycolic acid, an AHA produced from sugarcanes, on increased UVB sensitivity have been studied. At concentrations as low as 4%, glycolic acid has been demonstrated to impact the skin's sensitivity to UV light by increasing SBC and decreasing MED. This effect can last for up to 12 weeks. However, the sensitivity is still reversible after one week of discontinued use. After four weeks of topical glycolic acid administration, skin sensitivity to UV radiation, as evaluated by UV-induced CPD production, may increase. The observed rise which is 8% is not statistically significant, emphasizing that more research is needed to fully comprehend AHA's effects on exposure when it comes to UV-induced CPD formation. Thus, adding sunscreens to these acids containing cosmetics may have an effect on skin irritation to UV light radiation under particular conditions of use [7].

Malic and citric acids (MA and CA) are also "generally considered as safe" as direct food additives used as flavoring agents and enhancers, active medicinal components, and pH stabilization, according to the US FDA (U.S. FDA 1997). Ever since, they have been used in cosmetic formulations as pH modifiers and moisturizing agents. Clinical testing, on the other hand, has established that MA is an irritant, with irritation decreasing as the pH of the treated material increases. Their interactions with the skin, particularly the epidermis, might cause complications [7].

4.3. AHA-Induced Apoptosis

The acids Malic, Citric, and Lactic all-cause keratinocytes to die. Two identified pathways that cause cell death are known as mitochondria-dependent or (intrinsic) and death-receptor-dependent or (extrinsic). Fas receptor, Caspase-8, and Fas Ligand are all components of the crucial biological system that controls apoptosis in many tissues and cells. Moreover, in examining the keratinocyte system, the Cultured Human Keratinocyte (HaCaT) in vitro model is suitable as it has also been isolated from the male melanoma patient peripheral, together with histologically genuine skin tissues [7].

CA causes apoptosis in HaCaT cells via activating caspase-dependent and mitochondrial pathways. Caspases-8, Activation of the BID protein (BH3-interacting domain death agonist), Endonuclease G (Endo G), and apoptosis-inducing factor (AIF) levels are all increased as a result [19]. These pathways may help accelerate skin rejuvenation.

MA, on the other hand, induced antiangiogenic effects on HaCaT cells by inhibiting cell cycle development. MA acts through two methods: First, stress on the endoplasmic reticulum, and second, the signaling pathways that depend on mitochondria. Although it has a different structure from CA, they still induce apoptosis in the same manner [7].

5. BHAS AND SKIN CELL BIOLOGICAL RESPONSES

5.1. BHAs' Efficacy

BHAs scrape the skin surface, just like AHAs, but they also operate deep inside pores. Aside from that, BHAs also break the protein connections between skin cells, which helps to eliminate dead skin on the surface. Anti-inflammatory and photoprotective effects are also present in BHAs and have several mechanisms of action inside the pores. They exfoliate the pore lining, allowing oil to flow more freely and preventing the build-up of dead skin and sebum that causes clogged and strained pores [19]. They also limit the amount of oil produced by your skin and slow down the shedding of skin cells. Hyperkeratinization, which occurs when the body sheds skin cells too quickly, is linked to certain skin diseases, including acne. BHAs help dissolve oil and keratin clogs in existing comedones [19,20].

In contrast to AHAs, which are water-soluble, BHAs are lipid-soluble. As a result, penetration is substantially improved, and surface irritancy is reduced. That is why BHAs is recognized as a suitable alternative for acne-prone skin because they absorb effectively on oily skin [21]. Together with AHA, BHA is used to dissolve the build-up of sebum and dead skin. As a result, this keeps your skin fresh and younger-looking while reducing the chances of clogged pores and eventually acne [20]. Exfoliants include anti-acne medications. Salicylic acid is the active ingredient in most anti-acne treatments. Acne arises when dead cells, oils, and/or bacteria clog the hair follicles. Salicylic acid's nonpolar nature allows it to pass through clogged hair follicles and dissolve greasy intercellular cement. Dead skin cells and bacterial cells in the obstructed hair follicle are exfoliated as a result of this. As a result, the acne will get worse [20,22].

5.2. The Safety of BHAs

Despite their many advantages, hydroxy acids like beta hydroxy acids can have serious adverse effects such as stinging or burning sensations, prolonged erythema, blistering, purpura, skin irritation, and increased photosensitivity [13]. The side effects are determined by the hydroxy acid content, pH, and therapy period. When the concentration of hydroxy acids is higher, the treatment time is longer, and when the pH is very low, the danger of

side effects is greater [20]. The FDA (Food and Drug Administration) in the United States is investigating BHA's long-term safety, with current recommendations similar to those for AHAs in that sun protection is strongly suggested and use should be reduced if such irritation occurs [21]. Furthermore, with a period of 6 months of regular treatment, BHA has been shown to alleviate wrinkles, roughness, and uneven pigmentation in photodamaged skin. Beta hydroxy acid works best when incorporated in beauty products at a pH of 3 to 4 and a concentration of 1% to 2%[22]. Apparently, using BHA can cause a 50 percent increase in sun sensitivity which poses an interesting conundrum. BHA appears to restore unusual damages caused by photoaging. However, It also promotes skin more susceptible to photoaging. Anyone who uses this hydroxy acid should use a sunscreen that offers Ultraviolet A and Ultraviolet B protection [23].

Since sunscreen is really not effectively stable at the pH where BHA works, there are no viable products that mix the two. When utilizing a beta hydroxy acid product, use enough sunscreen. For UVB protection, the sunscreen should have an SPF of at least 15 (preferably 30 or higher), and for UVA protection, it should contain avobenzone, titanium dioxide, or zinc oxide [22]. BHA is best effective at a concentration of 1 to 2 percent and a pH of 3 to 4. Also, this acid is effective at lower concentrations, that is why it is seemingly placed in the middle of the ingredient list or even near the bottom, in contrast to AHA, in which indications of the right concentrations must be stated in the top three ingredients [23].

5.3. BHA-induced Apoptosis

Antioxidants including N-acetyl-l-cysteine and ascorbic acid also showed little effect on BHA-induced apoptosis indicating that it was independent of reactive intermediate production. The cytochrome c release was observed when hydroxy acids such as Beta were directly incubated with isolated mitochondria. As a result, BHA causes cytotoxicity by primarily inducing apoptosis through immediate cytochrome c release and subsequent caspases activation [13]. BHA-induced cytotoxicity was exacerbated by horseradish peroxidases, implying that BHA was oxidizable and produced toxic BHA radicals. In addition, BHA/BHT and BMP were used to promote internucleosomal DNA breakage in HL-60 cells, which was then followed by BHA. BHA/BHT or BMP decreased MnSOD mRNA expression in HL-60 cells as measured by reverse transcriptase-polymerase chain reaction, which was accompanied by a shift in MnSOD electrophoretic mobility on polyacrylamide gel [13].

5.4. Potential toxicity of AHA-BHA in the Body

Despite their widespread use of hydroxy acids, there are still opposing views that refute these assertions which cause negative effects or potential toxicity in the body particularly on the skin area. More so, there are various studies indicating the need for concern on the safety of AHAs and BHAs.

5.5. AHAs Potential Toxicity on the Skin

Tang, S.-C., & Yang, J.-H. (2018), stated that topical application of AHAs when too much exposure to the sun leads to an increased risk of photosensitivity of the skin UVB radiation and can cause uneven skin pigmentation. The FDA does not deliberate consequential concerns regarding the topical influence of AHAs particularly glycolic acid, especially at low concentrations. However, there are cautions reported in relation to the certain side effects and reactions to patients who extensively used AHAs products which include inflammation, swelling, redness, pruritus, and burning [13].

5.5.1 AHAs in Relation to Peeling, and UV Irradiation. Skin aging is one of the common problems in humans, particularly among the elderly. Studies indicated that the major cause of this chronic inflammation is the triggering of UV irradiation and other environmental pollutants. S.-C. Tang and J.-H. Yang (2018) additionally indicated that peeling is able to build up skin sensitivity to UV radiation and cause further serious skin damage, particularly when paired with AHA-related peeling products. Furthermore, it has been noted that individuals treated with GA at concentrations ranging from 20 to 50 percent for keratin layer removal will suffer substantial UV damage. In UVB-treated HaCaT cells, glycolic acid at significant concentrations, particularly 5mM, can have a synergistic effect on the number of reactive oxygen species (ROS) [13].

5.5.2 AHAs peeling concentration and pH. Antoniou et al. (2010) stated that AHAs cause the epidermis and dermis on the skin affected including its effects depending on the concentration and pH. They discovered that a 1% AHA concentration can change the pH of the stratum corneum's exterior. Consequently, 10% AHA content can affect 10 to 20 layers of the stratum corneum [13,23].

5.5.3 Glycolic Acid as AHAs Phototoxic properties. Glycolic acid has often been used as an ingredient to treat skin problems. However, there are findings that raised the concern over GA after topical application on the skin which increases skin photosensitivity. Notably, it has been reported that GA exerts different effects at different concentrations. This is due to the fact that they evaluated both high and low concentrations of GA to ascertain its phototoxic properties in relation to UVB-radiated skin keratinocytes. Based on findings from HaCaT cells, it indicates that at low concentrations of GA (0.1 mM; pH 7.4) it employs anti-inflammatory effects. On the other hand, at large levels of GA (5 mM; pH 7.1), it had a simultaneous phototoxic impact on HaCaT keratinocytes, breaking the cohesiveness of barrier function corneocytes, thus producing skin irritation. [13].

3.5.4. Glycolic Acid In Vivo Perspective. Attached below are the illustrations to the abilities of Glycolic acid to enhance or damage photosensitivity of the skin given at different concentrations. GA was applied to the skin of the subject in different quantities to provide a better understanding and support for Vivo methods. Skin irritations were evident at 3% and 5% high concentrations, however, at 1% and 2% low concentrations, it inhibited UVB-induced cytokines and chemokines, including MCP-1, TNF-, IL-1, IL-6, IL-8, and COX-2, hence protecting the skin.

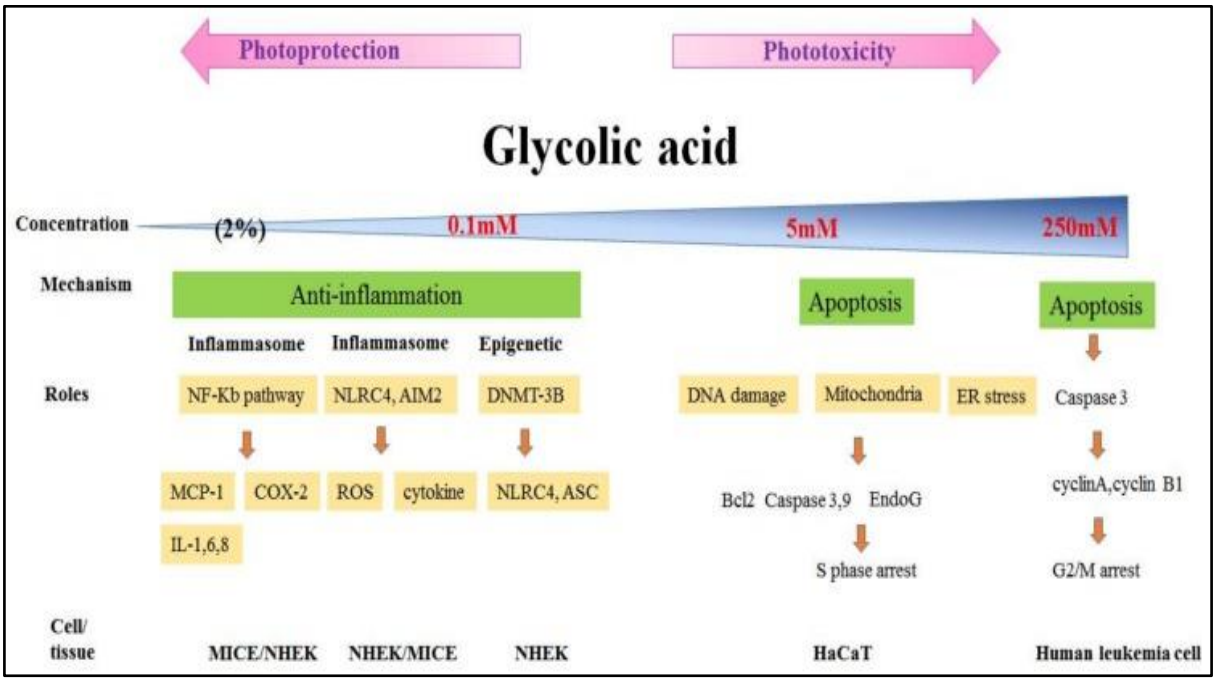

Figure 1. The photoprotection and phototoxicity effects of Glycolic acid.

Source: Tang S-C, Yang J-H. Dual effects of alpha-hydroxy acids on the skin. Molecules [Internet]. 2018 [cited 2022May10];23(4):863. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6017965/

5.6. BHAs Potential Toxicity on the Skin

Salicylic acid is one of the common examples of BHAs. Primarily, it helps to treat skin disorders and it has the ability to remove dead skin cells by exfoliating making it appear to be a good peeling agent. However, despite the benefits that salicylic acid can give to the skin, there are still adverse effects that occur ranging from mild and can only last for a short time. Arif, T. (2015) reported that Korean patients with acne vulgaris who underwent SA peeling assessment had protracted erythema, dryness, strong exfoliation, transient crusting, hypopigmentation, systemic toxicity, salicylism, hypoglycemia, and contact sensitization [24].

5.6.1 Salicylism, Hypoglycemia, and contact allergy or sensitivity. These known major adverse effects of SA have very rare phenomenon cases however, it raises a serious concern. Notably, for salicylism, Arif, T. (2015) reported that salicylates in high concentrations provide toxic effects on the central nervous system (CNS) which can basically provide clinical side effects such as purging, disorientation, hallucinations, lethargy, and, eventually, death. Furthermore, from a dermatological standpoint, salicylate poisoning will develop upon administering SA in the amount of 20%, a quarter of the surface area of a human body. It will also cause toxicity if the blood level rises beyond 35 milligrams per decilitre, uncommon in exfoliation procedures. For hypoglycemia, the same author and publication indicated that the overall absorption of salicylates influences glucose metabolism, resulting in hypoglycemia. Patients having this condition during absorption of salicylates will decrease the protein binding of the salicylates resulting in the free form in the blood relatively increasing. Lastly, for contact allergy, SA is known to be classified as a weak contact sensitizer. In most cases, this is only rare as it has been reported in a few cases. Associated with the occurrence of atopic eczema resulting from usage of such products are advised only if additional components employed in the preparation pose a danger [24].

5.6.2. Use of Salicylic Acid during Pregnancy. In this section, Arif (2015) stated that patients who are pregnant while using SA preparations such as for peeling are highly prohibited as it is related to the aspirin structure. Knowing the fact that using aspirin during pregnancy will increase the risk of harmful effects on pregnant women leading to loss of a pregnancy, defects during birth, internal bleeding, and salicylates poisoning. FDA has identified SA as a pregnancy Category C medication. On the other hand, Arif (2015) and March (2017) stated that AHAs are classified into category B which is oppositely used safely during pregnancy such as glycolic acid in lower concentrations of lactic acid, respectively [24,25].

AHAs and BHAs issue on FDA and Why These Products Raise Concerns:

With regards to the authorized cosmetic products appearing on the market, FDA advisory no.2021-1543 (2021) stated that the Food and Drug Administration has publicly warned consumers about purchasing and using cosmetic products that have issues and no authorized approval including the Ordinary AHA of 30% in combination with BHA 2% Peeling Solution. It has been reported that it has not followed the standard qualifications of the FDA and has no valid certificate. Thus, these unauthorized cosmetic products mentioned must raise a public concern as it does not undergo the notification system by the FDA, disabling them from ensuring their standard. Moreover, this can pose a harmful health risk to the consumers when not being guided. Anyone who sells distributes, transfers, promotes, and advertises these products without the authorization of the FDA agency should be prohibited. This can only be available to use if manufacturers have fully compiled the rules and regulations inclined to the FDA standards [26].

Additionally, FDA advisory no.2021-3068. (2022, January 12) stated that, the FDA has also warned the consumers in purchasing the product that contains AHA-BHA-PHA COMPLEX with the presence of HYDROQUINONE such as Vibrant Skin Glowing Toner as has been reported by the ASEAN Post-Marketing Alert System (PMAS). Adding that, the Department of Pharmaceutical Services Brunei Darussalam tested the product and it was revealed that it is not compliant with the ASEAN Cosmetic Directive (ACD). Also, in line with the presence of hydroquinone in the product, this could be prohibited to be used especially in the country the Philippines as it causes multiple adverse reactions. Using these products aggressively might cause photosensitivity, erythema, and hyperpigmentation [26,27].

AHA-BHA in the Pharmaceutical Industry:

Alpha hydroxy acids (AHAs) have been more prevalent in anti-aging skincare products during the last decade. A combination of AHAs and BHAs has been introduced to these skincare formulations. Both of these acids work as exfoliants, however, BHAs are considered more successful in improving the overall texture of the skin without the discomfort occasionally felt associated with the usage of AHAs [28].

AHA-containing products are recommended for reducing surface wrinkles, enhancing the texture of the skin, unclogging and sanitizing pores, and general skin health. Occasionally, there are used to modify the degree of acidity or alkalinity of cosmetic products. Exfoliation, often known as the shedding of the surface skin, is caused by AHA-containing cosmetics. The degree of exfoliated skin obtained is determined by the AHA concentration and type employed, as well as the pH of the solution and other compounds in the product [7]. Salicylic acid is the BHA that is most typically found in cosmetics at the moment. Citric acid is most generally known as an AHA rather than as a BHA [28]. AHA-containing creams and lotions may be beneficial in the treatment of wrinkles, enlarged pores, discolored skin, and age spots. While products containing salicylic acid, the most popular kind of BHA, may aid the prevention of rhytids, the improvement of the color and texture of sun-damaged skin, and the treatment of acne [29].

Skincare products containing any of the ingredients may cause irritation, redness, and an increased likelihood of getting a sunburn for up to a week after you stop using them. In general, a product with an AHA content of 10 percent or less and a BHA concentration of 1 percent to 2 percent may be considered less hazardous [29].

Cosmetic Products with AHA and BHA :

There have been several successful marketing campaigns for AHA-containing products for applications including acne treatment and scar removal as well as lightening discolorations. These include products labeled as Skin Peelers that may have AHA concentrations at a higher level and may contain acids used to discard the skin's outermost layer. Under the federal definition, products made for the purpose of treating acne or lightening the skin, for example, are categorized as medicines.

6. CONCLUSION

BHAs enhance skin barrier function, increase skin thickness, treat skin problems and stimulate collagen production because of their antibacterial and anti-inflammatory capacity. AHA, on the other hand, treat keratinization issues and enhance the look of photoaged skin and acne. With this review, it has been found that both of these acids provide exfoliating activity; however, current research shows BHAs work better than AHAs in enhancing the texture of the skin as they have been demonstrated to have less skin irritancy than AHAs, as well as an anti-inflammatory impact. The use of AHAs topically after extensive sun exposure raises the risk of photosensitivity of the skin to UVB radiation and can result in uneven skin pigmentation. Moreover, it is worth noting that products containing AHA-BHA-PHA COMPLEX with the presence of HYDROQUINONE, such as Vibrant Skin Glowing Toner, are in violation of the ASEAN Cosmetic Directive. Because of the inclusion of hydroquinone in the product, it may be forbidden from usage, particularly in the Philippines, where it can cause many adverse effects. This review emphasized the rising concern regarding AHA-BHA in cosmetic products. In conclusion, AHA-BHA's intricacy necessitates a comprehensive study. More study is needed to identify solutions to pharmaceutical firms' growing worries about AHA-BHA medication formulation.

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Conflict of Interest:

The researchers declare no conflict of interest.

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