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Sun Protections in Medical History

Ayman Yasin ATAT, Einstein Guest Researcher, Freie Universität Berlin, Seminar für Semitistik und Arabistik, Fabeckstraße 23/25, Berlin
Julia Pflug, Pharmacist, Germania Apotheke Wiesbaden & PROVOK Guest Student (PhD preparing program), TU Braunschweig, Abteilung für Pharmaziegeschichte

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During a short walk in the cosmetic stores, it is easy to be amazed by the countless bottles of sun protection, stocking the shelves. There are sunscreens and sun blocks, lotions, gels, and sprays; the list goes on and on (Aldahan et al. 2015, 1316). Here a question might arise about the history of sun protection. Therefore, this paper is going to highlight the pioneer stages in the development of sun protection through medical history.

Throughout history, people have had to learn not only to harness the power of the sun, but also to protect themselves from its rays. But sunscreens have never been the only method of sun protection: Other methods can be found in many other contexts like umbrellas, clothing, and nutrition (for more details, see Urbach 2001, 99; Feil 2019, 140; Bruhn 2010).

Having a look at ancient cultures, it can be seen, that they used a method which we today might call body painting (Gröning 1997, 10). They covered their bodies with mineral pigments of earth which reflect and absorb sun rays and were therefore used for the purpose of sun protection. Moreover, this method was used for other purposes, like protection against insects, body-jewellery, religious ceremonies, or camouflage while hunting and even served to indicate the social and political position or provide information about the profession practised (Ibid, 12). A beautiful example for body painting for sun protection purpose is Thanaka-paste, which is the stem bark powder of Hesperethusa crenulataor. Myanmar's women have used Thanaka on the face for more than a thousand years as a skin care regiment (Wangthong 2010, 466).

In early history, humans began to understand the detrimental effects that sun can have, especially to the skin. The first civilization to realize this and provide photo protective methods were the Egyptians in 4000BC. They used extracts of rice, jasmine, and lupine, ingredients

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that are still found in skincare today. (Ma and Yoo 2021, 1045). In the context of problems caused by the sun, like sweating and sunburn, in Papyrus Ebers, which originated around 1550 BC, a recipe can be found, containing incense, alum and myrrh (Winter 1999, 13).

In the ancient Greece, athletes covered their body with a mixture of oil and sand when training under the sun for the Olympic Games and around a similar time in 500BC, the effects of zinc oxide, a compound found in physical (topical) sunscreens today, were discovered in an ancient Indian medical text, "The Charaka Samhita". The text described the use of Pushpanjan (presumed to be zinc oxide), as a salve for eyes, open wounds, and burns. It has been used for many centuries since then, mainly for cosmetic purposes due to its whitening properties (Ma and Yoo 2021, 1045). Therefore, many forms of physically protection methods have been used: Celsus (1st Century BC) recommended covering the head and rubbing the skin with oil, the Tibetans used a combination of tars and herbs as sunscreens (Urbach 2001, 100).

One of the main factors for the development of sunscreen was to appear paler, as humans considered lighter skin to be more attractive than darker skin (Ma and Yoo 2021, 1045). The ideal of beauty was linked to the development and the usage of sun protection-products. The "aristocratic pallor" has been the predominant ideal of beauty for a very long time. Therefore, with their fair skin, the elites demonstrated their luxury lifestyle and their social status. Only people, who did not need to work, kept white-skinned. In the "Odyssey" (written around the 7th century B. C.) Homer mentions a skin "whiter than freshly sawn ivory" (Homer 1979, 18:196, p.304). Queen Elizabeth I. (1533–1603) who applied an ointment containing lead-white, which was known as Venetian ceruse or Spirits of Saturn, to her face to cover her pockmarks and to stress her noble look might work as a good example for that (Romm 1989, 94).

At this point, it can be seen that lead can serve as a good example for an ingredient in pharmaceutical forms that was undergone a change in history: It was used since ancient times. Dioscorides (d. 90 AD.) mentions it as a cooling, drying and astringent substance that can be used against eczema, burns and skin ulcer (Winter 1999, 139). For the same purpose Unguentum de cerussa, containing wax, rose-oil, white-lead, and camphor, can be mentioned. Almost the same composition can be found in German and European Pharmacopoea in the 19th century (Winter 1999, 139;141).

Interestingly, in the Japanese traditions, women intensively used a lead-white containing make-up. However, the elites of the Samurai-warrior suffered from symptoms of lead intoxication, because they already carried the lead inside their bodies gotten from their mothers and grandmothers as infants. Therefore, using lead might be blamed for the downfall of the Edo-Epoche (Japan, 1603-1867) (Nakashimaa T et al. 2011, 23). In the same context, and concerning the usage of lead in the Arabic medical tradition, we can observe that lead was

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used for sun burns, and not as a substance for protecting the skin from sunburns (Ibn al-Bayṭār, 1992, 1:43).

But considering sun protection in the Arabic civilization, we could see that Abū Bakr al-Rāzī (Rhazes d. 925 AD) mentioned some natural substances to protect the skin from sun radiation, like the deer brain, starch, and astragalus tragacantha, but mainly he mentioned the egg-white which he used either individually or within a recipe in combination with other substances (al-Rāzī 2000, 23:16-17). In the same vein, Ibn Sīnā (Avicenna, d. 1037 AD) recommended also egg white for this purpose of sun protection (Ibn Sīnā 2006, 4:377). In addition, Ibn Sīnā mentioned this recipe to prevent the skin from sunburns:

> "To protect the skin from sunshine you take samolina's bran soaked in filtered water and mix with the same amount of egg white, and paint the face with it" (Ibn Sīnā 2006, 4:377).

Interestingly, the aforementioned recipe was used for a long time in the Arabic civilization and later in the Ottoman realm. Al-Shirwānī (Muḥammad b. Maḥmūd was alive 1451 AD) wrote a very noticeable pharmaceutical encyclopedia called Rawḍat al-ᶜiṭr which served to be the main reference for the pharmaceutical practitioners in the Ottoman realm. In this text, al-Shirwānī mentioned the same recipe, containing egg white, to be used against sunburns (Istanbul, Hacı Beşir Ağa 506; 219).

Concerning the modern history, various plant extracts have been used at the turn of the twenty century in folk medicine. Considered to be the one of the most effective ones was a chestnut extract, from which the active ingredient aesculin was derived (Urbach 2001, 99). Later synthetic ingredients were in use. In 1928, Hausser and Vahle produced the first commercially available sunscreen (Ma and Yoo 2021, 1045). In 1936, the chemist Eugene Schueller (d. 1957, the founder of the brand L´Oreal) developed the product "Ambre Solair", which is still known today. Some years later, Fritz Greiter (d. 1985) invented the product "Piz Buin" (still in trade today) after he got a bad sunburn while climbing on the mountain Piz Buin in 1938 (Brenk-Lücke 2018). Only recently in 1992, the micronized use of zinc oxide for UVB protection became available (Ma and Yoo 2021, 1045).

But again, the market of natural products came back to the space of sun protection, and here it is worth to mention Achiote (Bixa Orellana) with its active ingredient Annatto (which is a natural dye or coloring agent, derived from the seeds). Its ethanolic seed extract in a concentration of 6 mg/L showed a sun protection factor of 40, (Teixeira da Silva et al. 2018, 270). Another example for modern research on sun protection agents, is an extract from licorice's root that is able to enforce the self-protection abilities of the skin, discovered by scientists at Beiersdorf (a globally active German Company) (Kühnl et al. 2015).

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To conclude the paper, we can say that, sun protection has a fascinating development in medical history. The story begins with the body painting of the ancient cultures, leads to the usage of lead-containing ointments, which were used for a long time to meet the requirements of the white skinned ideal of beauty, the "noble pallor" and tells us about the using of natural products like some plants extracts and egg white in the Arabic and Ottoman civilizations.

Finally, looking back at the last 100 years, it can be recorded, the awareness of skin health has steadily increased and scientists are busy inventing new products. In the future, it will be exciting to pursue the further development of research on working principles for the purpose of sun protection. Both, synthetic and natural compounds are (let's say) in a competition. There is a trend to "rediscover" herbal products that are in traditional use since a long time and transformed into new cosmetics today, meeting the requirements of modern sunscreens. Therefore, the history of sun protection will continue to be written in the future.

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