

# Natural resources – herbal oils in skin care

published in *Kosmetik International* 2019 (4), 30-33

Customers like herbal oils. Those who use or recommend them should be familiar with the matter, though, since customers also expect substantiated advice. Dr Hans Lautenschläger has compiled some interesting information on the subject.

Already the naming makes them a sympathetic component. Walnut-, sesame oil and so forth not only are indicative of good health but also their attributes “natural” and “bio” contrast pleasantly with the ingredients provided by the chemical industry. They have a long history of practical use that is traceable to the beginnings of cosmetic care. With herbal oils you know what you get. Compared to other substances there is no need for sophisticated marketing campaigns to achieve a certain level of awareness. Taking a closer look, however, the oils turn out to be a more complex matter. While a synthetic substance in fact is a single chemical matter, oils often consist of several hundred individual components with numbers and ratios considerably varying depending on provenance, vintage, cultivation method and subsequent manufacturing procedures. That is why quality evaluation requires for a certain knowhow that, to some extent, is comparable to the olive oil evaluation in the food sector.

## Different types

There are three types of herbal oils:

- Fatty oils – we also speak of liquid fats – usually are compounds which, like olive oil, consist of fatty acids and glycerin which are called triglycerides. They are commonly produced from fruits, their stones, pits or seeds.
- Liquid waxes have haptic characteristics similar to fatty oils, instead of glycerin however, they contain wax alcohols to which the fatty acids are linked to. Jojoba oil probably is the most popular representative of this group.
- Essential oils are multifaceted in terms of their structure. Dominating are terpenes with their often fragrant and slightly volatile components from the group of aldehydes, ketones and esters<sup>1</sup> that are distilled and

extracted from blossoms, leaves and roots. A typical representative is lavender oil.

Fatty oils are highly significant for the care of the skin – or more specifically for the care of the skin barrier. Besides triglycerides they comprise smaller amounts of accompanying substances that are responsible for the ad-on effects. Accompanying substances primarily are:

- Vitamins – in the form of the vitamins A and E and occasionally minor amounts of vitamin D.
- Sterols – or in other words, substances that resemble the natural cholesterol of the body and complement its protective function in the skin barrier.
- Phytohormones (isoflavones) have a slight estrogen-like, topical effect; they belong to the group of antioxidants because of their polyphenolic structure.<sup>2</sup>
- Squalene, a triterpene, is an unsaturated hydrocarbon and identical with the same-named sebum component. Avocado- and olive oil have a higher content of squalene.
- Dyes – often carotenoids, which are partly metabolized into vitamin A in the skin, and flavonoids with anti-oxidative characteristics.
- Fragrance compounds and bitter substances
- Anthropogenous substances in the form of pesticides originating from cultivation, environmental substances as well as residues and reaction products from refining processes.

## Processing-based factors

The concentration of accompanying substances substantially depends on the processing method of the oils. Without addressing the various treatment- and refining procedures

<sup>1</sup> Lautenschläger H, Riechprobe? Aldehyde und Ketone, *Kosmetik International* 2010 (5), 42-44

<sup>2</sup> Lautenschläger H, Flavone und Isoflavone – die Wirkstoff-Generalisten, *Kosmetik International* 2016 (10), 62-65

of the untreated natural oils<sup>3</sup> it can be said that cold-pressed oils contain a broader range of natural substances but also more pollutants and allergenic herbal components while the refining processes considerably reduce or completely remove the above-mentioned substances. This also applies to the sensitive vitamins. During the refining process, however, particularly at high temperatures, glycidol (an epoxy), monochloropropanediol (2-MCPD) and their fatty acid esters can form from the glycerin of the triglycerides.<sup>4</sup> Up to the present day no reliable data is available on the causality of allergenic reactions caused by topical application of these compounds.

The most important parameter of herbal oils is the fatty acid occupation (fatty acid pattern) of its triglycerides; in other words, the type and percentage share of the bound fatty acids. They differ from each other by their chain lengths and the number and position of their double bonds. Fatty acids without double bond are called saturated fatty acids; typical representatives are e.g. palmitic acid and stearic acid. Monounsaturated fatty acids with a double bond are oleic acid and palmitoleic acid. Polyunsaturated and essential fatty acids are linoleic acid with two double bonds as well as alpha-linolenic acid and gamma-linolenic acid with three double bonds. Essential in this context means that the acid is vital in physiological respect and only available via external source as for instance via herbal oils.<sup>5</sup>

### Degree of susceptibility to deterioration

The more unsaturated the acid respectively the oil, the more sensitive it is to atmospheric oxygen, radiation and heat. This also applies to the cosmetic use of the oils. Products with evening primrose-, borage-, rose hip-, kiwi- and linseed oil should be applied in the evenings or during days with no radiation exposure. They also are less appropriate for the care of the skin barrier since saturated acids are required for this purpose. Linoleic acid-rich oils which are a ceramide-I-substrate are an exception. Besides saturated acids and cholesterol, ceramides are the most significant components of the skin barrier.

<sup>3</sup> Lautenschläger H, Pflanzliche Öle und Extrakte – Essentielle Komponenten, Kosmetische Praxis 2007 (4), 8-10

<sup>4</sup> 3-MCPD-, 2-MCPD-, Glycidyl-Fettsäureester in Lebensmitteln: EFSA und BfR sehen Gesundheitsrisiko vor allem für jüngere Bevölkerungsgruppen, Mitteilung Nr. 020/2016 des BfR vom 07. Juli 2016

<sup>5</sup> Lautenschläger H, Essenzielle Fettsäuren – Kosmetik von innen und von außen, Beauty Forum 2003 (4), 54-56

The essential fatty acids of the omega-3 and omega-6 series are, above all, used for specific tasks as for instance the care of reddened, inflamed and atopic skin. Other than with oral intake and the thus related passage through the liver, the essential fatty acids applied on the skin are metabolized through the epidermal 15-lipoxygenase (15-LOX).<sup>6</sup> The thus related anti-erythematic effect quickly relieves the pain of minor burns, as for instance caused by „hot stove top“ contact, and also impedes blistering. This effect is historically known from zinc oxide-linseed oil-pastes. Today's nanodispersions of linseed- and kiwised-oil are easier to apply as they are available in the form of aqueous dispersions. Mosquito bites also can easily be soothed by applying evening primrose nanodispersion and urea. Neurodermitic patients with delta-6-desaturase defect also benefit from topically applied evening primrose oil.

The recommendations with respect to the ratio of saturated- to omega-3 and omega-6-acids issued by the food sector for food intake are not relevant for skin care purposes.

### The metabolism in the skin

Herbal oils already are topically metabolized in the skin. The first step consists of a subsequent elimination of fatty acids from triglycerides with the aid of epidermal lipases. In this process, first diglyceride, then monoglyceride and finally free glycerin is formed which is a component of the NMF (Natural Moisturizing Factor), among others. Saturated fatty acids such as the palmitic acid of avocado oil or behenic acid (rapeseed, peanuts) can be integrated into the skin barrier or degraded via beta-oxidation while the unsaturated acids are initially degraded by lipoxygenases. Degrading enzymes of the skin flora (microbiome) also play a substantial role in the process and thus help to build up the typical pH value („acid mantle“) of the skin.

### Everything depends on the processing

Considering the dosage of oils in creams it should be kept in mind that an oversupply can create anaerobic conditions on the skin. Such conditions support the growth of unwanted microorganisms and associated with it the presence of blemished skin and rosacea. A further critical item is the use of emulsifiers that help disperse oils into O/W- or W/O-emulsions. Emulsifiers can have irritant effects on the skin or cause counterproductive wash-out effects during skin cleansings when they are not de-

<sup>6</sup> Lautenschläger H, Das ABC der Fettsäuren, Beauty Forum 2009 (12), 40-47

graded in the skin. These effects can be avoided by using emulsifier-free lamellar dispersions or by using the above-mentioned physiologically compatible mono- and diglycerides as cosmetic additives. The penetrability of oils can be considerably improved with phosphatidylcholine which occurs in herbal cell membranes. Thanks to the resulting nanotechnology the unpleasant oily films have become a thing of the past. Also the spreading of oily products on the skin is significantly improved. The dryer and possibly also more mature the skin is, the more long-chained saturated fatty acids are needed, as for instance those occurring in macadamia nut oil. Short-chained and higher unsaturated oils such as apricot stone oil have a higher fluidity and hence a shorter residence time on the skin surface.

With regard to the fatty acid patterns of single fatty oils<sup>7</sup> it should be mentioned that classic oils often are better than today's highly praised and specially promoted expensive oils. In this context it is literally worth while studying and comparing the respective specifications of the oils. Thanks to reliable databases published in the worldwide web or Wikipedia the data are easily accessible.

### Oil stability

The shelf life of herbal oils depends on various factors. The susceptibility of oils to deterioration increases with the amount of polyunsaturated acids and is reduced with anti-oxidative accompanying substances or additives as well as with low storage temperatures and the exclusion of light. Both jojoba oil, that belongs to the liquid waxes, and the universal neutral oil that only contains saturated however medium-chained fatty acids (INCI: Caprylic/Capric Triglyceride) have a particularly high stability to oxidation. Neutral oil is a refined product made from coconut- or palm oil.

Pure oils with high sterol content tend to precipitate at low temperatures, a process which is reversed with heating. Since high sterol ratios are particularly valuable for the skin barrier and skin protection, precipitations are not a disadvantage but rather a quality feature that can also be observed with olive oils for household use.

### Various applications

Concluding, it should be mentioned that besides the standard processing of oils in creams, body oils and lotions, the various classic applications of oils still are up to date. They comprise massages – often with oil mixtures –

as well as the salt and sugar peelings with these oils. Further examples are a non-irritant intimate care<sup>8</sup> and emulsifier-free oil baths<sup>9</sup> for the atopic skin. A more recent development is the processing of fatty oils into oleogels<sup>10</sup> for skin care purposes that can also be administered in the case of rosacea<sup>11</sup>.

Dr. Hans Lautenschläger

<sup>7</sup> Lautenschläger H, Pflanzenöle, Kosmetik International 2009 (1), 16-18

<sup>8</sup> Lautenschläger H, Intimpflege – sensibel & schonend, medical Beauty Forum 2017 (6), 38-41

<sup>9</sup> Lautenschläger H, Therapie und Wellness in der Wanne – Balneogische Präparate, Pharm. Ztg. 148 (3), 22-26 (2003)

<sup>10</sup> Lautenschläger H, Vorteile von Produkten ohne Wasser und Hilfsstoffe, Kosmetik International 2017 (6), 56-58

<sup>11</sup> Lautenschläger H, Kloss J, Patentanmeldung DE 102017002125 (8.3.2017)