

The potential benefits of using aloe vera in stoma patient skin care

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ABSTRACT

Individuals living with an ostomy may suffer from a variety of peri-stomal skin complications related to the use of their stoma appliance or accessories. These conditions can be serious enough to significantly impact on a patient's quality of life and may result in severe clinical complications (such as infection). This article is a review of the literature with the objective of investigating and presenting evidence for the well-documented use of aloe vera in the prevention of skin conditions similar to those seen in peri-stomal skin complications. An exploration for the potential use of aloe vera directly or indirectly (as an adjunct to medical devices such as wafers) in stoma patients is presented with the view that this use may be beneficial in the prevention of such peri-stomal skin complications.

Key words: Peri-stomal skin complications ■ Aloe vera ■ Ileostomy ■ Colostomy ■ Dermatitis ■ Maceration ■ Excoriation ■ Infection

Peri-stomal skin complications are common, with rates of up to 60% having been reported (Burch and Sica, 2008; Erwin-Toth et al, 2010). More specifically, Salvadana (2013) reported an incidence of peri-stomal skin complications of 63% in the first 3 months after the stoma was formed. There are a number of reasons why these conditions can occur, the most common being skin irritation due to leakage of either faeces or urine (Burch, 2014). Additionally, the abnormal stresses (occlusion, maceration, irritation and shearing forces) on the skin underneath the stoma appliance can increase infection, allergy and/or irritant dermatitis (Williams et al, 2010; Ratliff, 2014). Infections account for 6% of skin problems and might be bacterial, fungal or viral in origin (Lyon et al, 2000a; Lyon and Smith, 2001; Nybaek and Jemec, 2010). In addition, pre-existing skin diseases such as

psoriasis and atopic eczema cause 9% and 5%, respectively, of the skin problems seen with stoma patients (Lyon et al, 2000a). Surprisingly, an allergy (for example, to hydrocolloid adhesives) is quite rare (<1%). However, peristomal pyoderma gangrenosum, an auto-inflammatory non-infectious neutrophilic dermatosis, is moderately common (>4%). Pyoderma gangrenosum occurs in about 1% to 5% of patients with inflammatory bowel disease and peri-stomal pyoderma gangrenosum is particularly difficult to manage (Poritz et al, 2008; Shahid et al, 2014). Cases of lichen sclerosis (Al-Niaimi and Lyon, 2013) and skin necrosis (associated with the angina drug, nicorandil) (Mandal et al, 2014) have been documented around a stoma site. More than 10% of all peri-stomal skin complications are not attributable to any of these conditions but to a chronic irritant process related to the occlusion of the stoma appliance (Lyon et al, 2000a).

The primary goal of stoma management is the maintenance of healthy peri-stomal skin (Williams et al, 2010). As skin conditions are so widespread, a skin-friendly method of prevention is required. There is very little direct evidence for the use of traditional compounds based on the aloe vera plant in preventing or treating peri-stomal skin conditions. However, this article aims to present evidence from the literature that shows how aloe vera has been used to treat similar skin conditions. From this indirect evidence, it is proposed that aloe vera could be useful in a preventive regimen for a wide variety of peri-stomal skin conditions.

A review of the literature was undertaken with the primary objective of providing clinical evidence that demonstrates the effectiveness of aloe vera in treating skin conditions similar to those seen in peri-stomal skin complications and therefore support its use in maintaining healthy skin in stoma patients. However, as there is a large amount of information available this article was designed as a mini-review of relevant literature. The bibliographic databases PubMed and Medline were searched to identify systematic reviews and primary studies addressing the background related to skin complications in patients with stomas and the use of aloe vera to treat a variety of defined skin conditions (caused by different pathological mechanisms). Google Scholar was also used as a search engine to find supporting information.

Skin damage around stomas Background

Surgical procedures resulting in the formation of an ileostomy, colostomy or urostomy are fairly common with around 6400 procedures performed in the UK each year (NHS Choices,

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Figure 1. Presentation of common peristomal skin conditions



2015). There are an estimated 120 000 people living with an ostomy in the UK, of which 65 000 have a colostomy, 45 000 have an ileostomy and 10 000 a urostomy (Jowett, 2014).

A number of complications following ostomy surgery have been reported. The most common are retraction, hernia, prolapse, peri-stomal skin complications, and necrosis (Salvadarena, 2008). Depending on the type of stoma created, peri-stomal skin complications have been reported to be the most common postoperative complication (Meisner et al, 2012) with an incidence that ranges between 30% and 60% (Burch and Sica, 2008; Erwin-Toth et al, 2010). In a study by Williams et al (2010), peri-stomal skin problems in 80 ostomy patients in the UK were investigated using a structured questionnaire and clinical evaluation. The results showed that 32% had healthy peri-stomal skin and 68% had peri-stomal skin problems, of whom 44% had irritated skin, 12% had ulcerated skin, 9% had an apparent allergy and 3% had macerated/eroded skin.

Peri-stomal skin conditions also have a significant effect on patient quality of life, causing severe distress and anxiety (Nybaek et al, 2010; Davenport, 2014). Such skin complications are very costly to manage—the estimated mean cost of treating severe peri-stomal skin complications has been shown to be £303 vs £151 for a stoma patient without complications (Martins et al, 2012).

Peri-stomal skin complications

Peri-stomal skin complications are the most common postoperative problem following creation of a stoma (Lyon et al,

2000b; Salvadarena, 2013). These include excoriation, dermatitis (allergic/irritant or contact dermatitis), maceration, infection, skin stripping and peri-stomal pyoderma gangrenosum (Figure 1).

Excoriation

Excoriation is defined as an injury to the surface of the skin, caused by trauma, such as scratching, abrasion (skin stripping), or a chemical or thermal burn (Dorland, 2007), often in the presence of maceration due to incontinence (Alvey and Beck, 2008; Stephen-Haynes, 2014). Approximately 45% of patients living with an ostomy suffer from this problem, which results from digestion of the epithelium by enzymes in the mucus flowing out of the stoma (Phadke, 2009) or by the action of urine (Alvey and Beck, 2008). This is often seen when the protective hydrocolloid wafer is cut incorrectly, allowing faeces or urine to come into direct contact with skin. This irritation of peri-stomal skin is more frequently seen with ileostomies than with colostomies due to the more liquid, caustic nature of the bilious small intestinal contents (Kann, 2008). A study undertaken by Robertson et al (2005) showed that complication rates for skin excoriation, leakage, soiling or night-time emptying were higher among ileostomy patients.

Dermatitis

Dermatitis or inflammation of the skin presents in a number of ways in patients living with an ostomy (Fischer et al, 2003; Martin et al, 2005; Watson et al, 2013) (Table 1). In ostomy

patients peri-stomal dermatitis is a common problem (Rudoni, 2011) arising from chemical, mechanical, irritant, bacterial, immunologic, or disease-related aetiologies (Agarwal and Ehrlich, 2010). Irritant reactions, particularly irritant contact dermatitis, are the most frequently seen, accounting for over 50% of problems in some studies (Al-Niaimi et al, 2012).

Maceration

Maceration is defined as the softening and breaking down of skin resulting from prolonged exposure to excessive amounts of fluid such as urine or stool, sweat and wound exudate (Gray et al, 2013). When applying a pouch, skin barriers are cut or moulded to fit around the stoma to protect the underlying skin from such harmful elements of stoma output (Colwell et al, 2011). These barriers maintain moisture balance and essentially keep the skin dry by absorbing small amounts of stomal effluent and sweat. However, if too much moisture is absorbed from the stoma, the barrier will cease to be effective, allowing the effluent to come into contact with the peri-stomal skin. Additionally, too much moisture retained underneath the barrier will lead to maceration (Voegeli, 2013). Other factors identified as contributing to maceration include chemical irritants, fluid pH, mechanical factors (such as shear and friction) and associated microorganisms (Colwell et al, 2011; Gray et al, 2013; Stephen-Haynes, 2014). A significant consequence of moisture damage caused by urine is that the alkaline nature of urine increases the skin's pH, changing it from acidic to alkaline and as a result may promote the enzymatic activity of proteinases and lipases (Zulkowski, 2012).

Skin stripping

Repeated application and removal of adhesive appliances to the peri-stomal skin can cause removal of skin layers (Berry et al, 2007). Skin stripping alters the barrier properties of the skin, exposing lower levels of skin cells that will be susceptible to urine/faeces and the pathogenic bacteria and viruses that have the potential to cause infection. Skin stripping itself results in pain and suffering to the patient (White, 2014). Once the skin has become denuded it is then much harder to achieve a good seal and the peri-stomal skin condition becomes exacerbated (Alvey and Beck, 2008).

Infection

Infection can also be a problem among ostomy patients. For example, the incidence of septic complications immediately following colostomy surgery varies from 0.5% to 25% (Salles et al, 2008). This is because any compromise of skin integrity by either maceration or excoriation may allow entry of pathogens into the subcutaneous tissues (Farage et al, 2007; Gray, 2007). Infection-related complications in stoma patients are predominantly bacterial or fungal in origin. Two common peri-stomal skin infections are folliculitis (caused by *Staphylococcus*) and candidiasis (*Candida albicans*) (Rolstad and Erwin-Toth, 2004; Kalashnikova et al, 2011). Folliculitis is an infection of the hair follicle that causes pustules, caused by traumatic hair tugging from the skin during pouch removal or by shaving to remove excess hair to enable better adhesion. Candida infections may arise because the peri-stomal environment under the pouch

Table 1. Dermatitis-related peristomal skin conditions

Irritant contact dermatitis	This occurs when substances causing skin irritation are in direct contact with and damage the outer layer of skin. In stoma patients it might be caused by dressings or topical preparations used in stoma care or by the improper placement of stoma equipment, resulting in constant exposure to faeces or urine (Lyon et al, 2000a; Rolstad and Erwin-Toth, 2004)
Chemical irritant dermatitis	Caused by irritation or inflammatory agents, such as gastric secretions, mucus, solvents, or cleansing materials and ostomy effluent is most often seen (Nybaek et al, 2010).
Mechanical dermatitis	Movement of stoma support belts or the hard plastic components of the ostomy pouch system across the skin may be abrasive and skin damaging, causing a dermatitis response (Rolstad and Erwin-Toth, 2004).
Allergic contact dermatitis	This is an allergic reaction caused by sensitivity to the components of the appliances used to manage stomas (sealing rings, ostomy pouch, topical ointments, deodorisers, adhesives, and skin cleansers). Although often cited as the cause of peristomal skin problems, it is rare with a prevalence of 0.6% (Nybaek and Jemec, 2010). This is despite the continual exposure of skin to the components of cleansers, medicaments, other accessories and the stoma bag systems themselves (Al-Niaimi et al, 2012)

is warm and dark, ideal for fungal growth (Woo et al, 2009). Peri-stomal skin infections may also be caused by a virus (such as herpes zoster or herpes simplex)—viral infection may lead to bacterial infection (Turnbull, 2005).

Pyoderma gangrenosum

Pyoderma gangrenosum is an inflammatory neutrophilic dermatosis in which a painful nodule or pustule breaks down to form a progressively enlarging ulcer. The name relates to the appearance of the ulcers, which have a purulent surface ('pyoderma') and a blue-black edge ('gangrenosum'). It is characterised by recurrent cutaneous ulcerations with mucopurulent exudate, often web-like in appearance. The ulcerative lesions can rapidly evolve from small, erythematous pustules to deep, painful, pyogenic ulcers within hours to days of onset (Kelly, 2012; Wu et al, 2013). Pyoderma gangrenosum in stoma patients is generally associated with inflammatory bowel disease (Hanley, 2011) and occurs in about 1% to 5% of patients (Poritz et al, 2008).

Quality-of-life issues

If leakage, soiling and foul odour occurs, this will obviously cause distress to the patient in their day-to-day activities and social interactions and can have significant impact on patients' quality of life (Rosenbaum, 2012; Taylor et al, 2012). This results in the patient possibly suffering fear, anxiety, embarrassment and, in some cases, depression. Thus prevention and management of peri-stomal skin complications are critical components of ostomy care.

Current treatments

Identifying risk factors for skin complications according to types of injury and clinical features can help optimise assessment and management approaches (Rolstad and Erwin-Toth, 2004). Treatment is based on aetiology, whether chemical injury,

mechanical injury, infection, immunologic disorders or disease-related lesions (Rolstad and Erwin-Toth, 2004).

For excoriated skin, there are a number of options, such as use of barrier film, which provides a protective layer, and wipes or powder that help dry an excoriated area so that a pouch can adhere successfully. Skin sealant also reduces epidermal stripping (Alvey and Beck, 2008). Silicone adhesive removers are also routinely used in stoma care to aid removal of the adhesive flange, thereby minimising skin stripping (Rudoni, 2008; 2011).

Treatment of peri-stomal skin complications may involve the use of topical preparations, or barrier products and preparations (Woo et al, 2009). However, the oiliness of some topical preparations can affect adhesion of the stoma appliances (Lyon et al, 2000b). To avoid this complication, topical creams should be applied very sparingly under a hydrocolloid appliance, possibly with a secondary dressing, or after excess cream has been removed with a tissue and powder lightly puffed on to the skin. Long-term use of topical corticosteroid therapy can be problematic and is associated with side effects to the skin (such as atrophic and telangiectatic skin conditions (Lilley et al, 2005)) and can be detrimental to the healing of any damaged skin.

There is evidence to suggest that some plant extracts (such as chamomile) may be beneficial in treating peri-stomal skin complications. A study by Charousaei et al (2011) evaluated the effect of a chamomile solution versus topical steroids on peri-stomal skin lesions in colostomy patients. The results indicated that lesions healed considerably faster in the chamomile group compared with the hydrocortisone group. A conclusion from this study was that using herbal extracts could be an alternative treatment and could avoid the side effects observed after long-term topical corticosteroid use. According to other studies, chamomile has also been shown to have anti-inflammatory (Mamalis et al, 2013), antibacterial and bacteriostatic properties (Chung et al, 2007) and promote healing (Martins et al, 2009). It is logical to assume that aloe vera, which has similar and more proven benefits than chamomile, could be used to help prevent peri-stomal skin complications that have similar aetiology and presentation.

Evidence for the use of aloe vera

Source and potential active ingredients

Aloe vera is a plant species of the genus *Aloe* that grows wild in tropical climates around the world and is cultivated for agricultural and medicinal uses. Its leaves contain a variety of phytochemicals beneficial in medicine eg. acetylated mannans, polymannans, anthraquinone C-glycosides, anthrones, and anthraquinones (Irshad et al, 2011).

Traditional use of topical aloe vera for skin problems

Aloe vera has been used for over 6000 years and has many medicinal uses including treating skin conditions, as an aid to wound healing and as a laxative. Today, in addition to these uses, aloe is used as a folk or traditional remedy for a variety of conditions, including orally for diabetes, asthma, epilepsy, and osteoarthritis, and topically for osteoarthritis, burns, sunburn and psoriasis (Klein and Penneys, 1988; Feily and Namazi, 2009). Aloe vera can be found in hundreds of skin

products, including lotions and sunblocks—these products contain multiple constituents with potential biological activities (Boudreau and Beland, 2006). Aloe vera contains a number of potentially active constituents: vitamins, enzymes, minerals, sugars, lignin, saponins, salicylic acids and amino acids (Shelton, 1991; López et al, 2013)

Evidence for the use of aloe vera to maintain healthy skin condition

Aloe vera has been used to treat a variety of dermatological conditions (Graf, 2000; Kim et al, 2010; Morelli et al, 2010; Panahi et al, 2012a; Haddad et al, 2013; Dohil, 2013).

The use of aloe vera in treating dermatitis has been reviewed (Fowler et al, 2010; Dohil, 2013) and some literature reviews have supported its use in various indications, including that of dermatitis (Feily and Namazi, 2009). Specifically, aloe vera has been shown to be effective in treating atopic dermatitis, a chronic inflammatory skin condition characterised by xerosis and chronic pruritic eczematous skin lesions. Both genetic and environmental factors contribute to immune dysfunction and epidermal barrier defect in patients with atopic dermatitis. Moisturisers are used to help treat this skin condition (Sirikudta et al, 2013).

Aloe vera has been shown to be effective in treating a dermatological condition (nappy rash) that has the same presentation and causes as peri-stomal dermatitis. In nappy rash the skin covered by a nappy is exposed to friction and excessive hydration, has a higher pH than normal skin, and is repeatedly soiled with faeces that contain enzymes with a high irritation potential for the skin. The combination of these factors frequently results in skin damage, leading to visible erythematous lesions that can be irritating and painful. A randomised comparative clinical trial on the therapeutic efficacy of topical aloe vera and calendula (*Calendula officinalis*) on diaper dermatitis (nappy rash) in children was undertaken. The results showed that applications of topical aloe vera or calendula were safe and effective for the treatment of nappy-related dermatitis (Panahi et al, 2012b). More recently, researchers identified that a defined skin-care protocol using a cleanser with aloe vera decreased the incidence of moderate incontinence-associated dermatitis (Conley et al, 2014)

Radiation dermatitis presents in a similar fashion to that seen in peri-stomal dermatitis, where patients may experience moist desquamation and ulceration (Bernier et al, 2008). A study by Di Franco et al (2013) evaluated a number of moisturising products for the prevention of acute skin side effects in patients treated with radiotherapy for breast cancer. All moisturising creams used in this study including one containing aloe vera plus other ingredients (Radioskin 2) demonstrated beneficial results with regards to the treatment of skin damage induced by radiotherapy. A further study evaluated aloe vera for prevention of radiation-induced dermatitis. In this study patients (n=60) were given aloe vera lotion to use on one half of the irradiated area, with no medication to be used on the other half. The grade of dermatitis in each half was recorded weekly until 4 weeks after the end of radiotherapy. The study concluded that the prophylactic use of aloe vera can reduce the intensity of radiation-induced dermatitis (Haddad et al, 2013).

Moisture-associated skin damage

Moisturising agents help to retain moisture and the viscoelastic properties of the skin and in doing so enable the skin barrier to maintain its integrity and help prevent damage such as dehydration or excessive hydration (maceration). These agents are also very important in maintaining the epidermal barrier, which has a variety of functions (as an immunity, antioxidant and antimicrobial barrier, and for photo-protection and hormone receptor functions) (Del Rosso and Levin, 2011).

Improper skin care can worsen any dermatological condition or impede the treatment outcome (Draelos, 2005). It is important therefore that the hydration of the skin is maintained at an optimum level to aid in the prevention of peri-stomal skin complications. There is good scientific evidence that aloe vera is an effective moisturiser, the mechanism of which is thought to be owing to its high sugar content, which allows it to act as a humectant, attracting and holding water in the epidermis (Dal'Belo et al, 2006; Saraf et al, 2010; Di Franco et al, 2013). The moisturising effect of cosmetic formulations containing aloe vera extract in different concentrations (0.10%, 0.25% or 0.50% (w/w) (freeze-dried) was tested in one study. The results showed that aloe vera improved skin hydration (Dal'Belo et al, 2006). A number of other studies have also demonstrated the moisturising capabilities of aloe vera and hence improving the viscoelastic and hydration properties of skin (Saraf et al, 2010). Additionally, both aloe vera and *Aloe ferox* (another species of aloe, also known as Cape aloe or bitter aloe) have shown potential to reduce erythema on the skin similar to that of hydrocortisone gel (Fox et al, 2014).

Infection

The main causes of peri-stomal skin infections relate to pathogenic bacteria such as *Staphylococcus*, streptococci, enterococci or fungal candida (Turnbull, 2005). Although no data exist relating to the use of aloe vera in peri-stomal skin infections, it is possible to draw conclusions from clinical studies of skin infections that present with a similar profile of micro-organisms to those seen in peri-stomal skin complications. For example, a study by Banu et al (2012) evaluated the efficacy of fresh aloe vera against multidrug-resistant bacteria in infected leg ulcers. In this study, the bacteria isolated were *Staphylococcus aureus* (of which 71.4% were methicillin-resistant *Staphylococcus aureus* (MRSA)), *Pseudomonas aeruginosa*, *Citrobacter koseri*, *Proteus vulgaris* and *Enterobacter spp* 2. After treatment of the wounds with aloe vera dressings, growth of bacteria in the study group decreased from 100% (30 cases) to 6.7% (2 cases) by day 11 with $p < 0.001$, while the growth of bacteria remained constant in the control group (Banu et al, 2012). In an experimental animal study it was shown that wound bacterial counts were significantly ($p = 0.015$) decreased by application of a wound gel containing aloe vera extract (Rodríguez-Bigas et al, 1988).

Anti-inflammatory properties

A consequence of both dermatitis and infection is inflammation. Aloe vera has anti-inflammatory properties (Vijayalakshmi et al, 2012) and also prevents pruritis, which is associated with these problems (Oyelami et al, 2009; White-Chu and Reddy, 2011).

In a study evaluating the effectiveness of aloe vera compared with 1% silver sulphadiazine cream in burns, aloe vera not only showed greater effectiveness for wound healing, but also provided pain relief for the patients (Shahzad and Ahmed, 2013).

Conclusion

The creation of stomas and use of appliances may result in a variety of peri-stomal skin conditions that can have a damaging effect on patients' quality of life and may cause clinical sequelae that will be detrimental to patient health. The majority of these peri-stomal skin complications have parallels in relation to other dermatological problems that have been treated by aloe vera. The evidence presented in this literature review draws a positive conclusion to support the premise that aloe vera will have a beneficial clinical impact in preventing peri-stomal skin complications. **BJN**

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KEY POINTS

- People living with an ileostomy, colostomy or urostomy experience a variety of peri-stomal skin complications that can be related to use of their stoma bags or accessories
- Skin conditions related to the use of a stoma, including dermatitis, can significantly impact a patient's quality of life and may result in severe clinical complications, such as infection
- Aloe vera has been used in the treatment or prevention of skin conditions similar to those seen in peri-stomal skin
- It is proposed that the use of aloe vera may be beneficial in the prevention of such peri-stomal skin complications

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CPD reflective questions

- Do you see and/or are you required to treat peri-stomal skin conditions in your practice? What are the main types?
- How do you usually manage patients with peri-stomal skin conditions?
- Are the current preventive measures or treatments that you see in practice for preventing and treating peri-stomal skin conditions effective, and why?
- After reading this article, what are your thoughts on how aloe vera could be used to help prevent or treat any of the peri-stomal skin conditions that you see in practice?