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Contents

Skin necrosis after tattoo removal

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Key words: *tattoo removal, lasers, skin necrosis, wound healing*

Introduction

In recent years, the popularity of tattooing among young people has significantly increased worldwide: approximately 24% of the US population have one tattoo at least (1), while in Italy the incidence of tattooed people is 12.8%, in line with the average incidence among the European population (2).
The current uptrend in tattoos demand is paralleled by the need for tattoo removal, due to regret, social reasons or tattoo-related diseases (3). Tattoo removal is a medical practice, requiring high expertise. In the past, mechanical procedures, chemical products or surgery were burned with suboptimal results, and the advent of lasers has revolutionized the field. Q-switched lasers are currently becoming the standard in tattoo removal: they produce nanosecond (ns) pulse durations of approximately 5-100 ns at various wavelengths such as ruby (694 nm), alexandrite (755 nm), and Nd:YAG (532 nm and 1064 nm) lasers (4, 5). Picosecond (ps) pulse lasers, with shorter pulse durations of 350 – 750 ps, have been recently developed (6). Pulse lasers emit wavelengths optimizing the interaction with specific chromophores within a tattoo and generating selective photo-thermolysis, to minimize collateral damages related to the elimination of the tattoo particles in the skin. Tattoo laser treatments are usually performed in multiple sessions with several weeks apart. At each session, a portion of the tattoo pigment particle is fragmented, and the body removes these fragments over the course of several weeks via blood vessels or the lymphatic system.

The length of time required for the removal of a tattoo varies depending on each individual. Side effects and complications may occur (Table I), either temporary or permanent, with an overall incidence of about 5% (7). Temporary side effects include pain, erythema, crusting, pinpoint bleeding, blistering, swelling, infection, and pigmentary disorders. Permanent side effects include scarring, hypo- or hyper-pigmentation, and color change of tattoo pigments. According to the pigment, allergic or photoallergic reactions may occur. For all these reason, only medical doctors are accredited to perform this procedure, which is safe but invasive and needs adequate training and expertise.
We report a case of an unusual side effect after tattoo removal with q-switched laser, performed by non-medical personnel, inducing necrosis of the skin, not described as a side effect of the procedure.

Temporary side effects	◦ Pain, ◦ Erythema, ◦ Crusting ◦ Pinpoint Bleeding ◦ Swelling, Blistering ◦ Infection ◦ Pigmentary Disorders.
Permanent side effects	◦ Not complete removal ◦ Residual hypo- or hyper-pigmentation ◦ Color change of tattoo pigments ◦ Scarring
Complications	◦ Lymphangitis and lymphadenitis ◦ Allergic reaction ◦ Photoallergic reaction ◦ Malignant tumors development

Table I. Tattoo removal side effects and complications.

Case report

A 25-year-old woman presented as urgent visit to the Dermatology Department of Cagliari University, with a single ulcerative lesion on the medial side of the right ankle, irregularly oval-shaped, 4x3 cm diameter, red and dark, slightly painful and weeping black pigment. She had had a black tattoo on her leg for 5 years, she wanted to remove and had starting removal one month before our visit. After the second sessions of q-switched laser performed by non-medical

Fig. 1. *Ulcerative lesion after debridement, on the medial side of the right ankle, irregularly oval-shaped, 4x3 cm diameter, red and dark, slightly painful and weeping black pigment. The removed necrotized skin is visible at the right margin of the photo.*

personnel in a local beauty center, she suffered an intense pain soon after and noticed abrupt skin discoloration, redness and swelling, then the all tattooed skin came away, leaving the deep ulceration at the laser-treated site (Fig. 1).

Due to the delicate body position, exposed both to external agents and movements, a moist occlusive foam dressing (AQUACEL® Ag, ConvaTec Inc., Princeton, NJ, USA) was applied, to be changed every three days. Surgical intervention was not necessary because of the burn depth confined to the subcutis. The timely wound dressing resulted in a favorable healing process, re-epithelialization rate was very fast, and the patient reported minimal discomfort with movements, as well as an easy dressing change. The skin defect was closed in about 3 months. After complete healing, the use of silicon dress and photoprotections was recommended to avoid hypertrophic scarring. After 1-year's follow-up minimal scarring without altered pigmentation is visible (Fig. 2).

Fig. 2. *Results of moist dressing medication: ulcer closing at 1-month, with minimal scarring, and complete remodeling without sequelae visible at social distancing at the 1-year follow-up.*

Discussion

In recent years, aesthetics has become quite important in our lives and the requests for aesthetic services have increased significantly. The growth of the industry has led to more people wishing to be involved in the business of providing aesthetic cares, both health care workers and non-medical practitioners. Aesthetic medicine has become a new field of medicine, encompassing several specialties and not specialized personnel to improve people's healthiness and quality of life, providing a wide number of interventions, including the use of lasers. Tattoo removal is a new frontier in the latter field, largely requested in parallel with the increased trend of having tattoos. Multiple adverse reactions related to this procedure have been reported, but neither necrosis nor ulcerations are described. In our patient, skin necrosis occurred almost surely as consequence of the thermal damage produced by the laser source. No parameters of the treatment laser were provided to the patient, but the delicate site of the tattoo, on the ankle, with very scarce subcutis, and superficial vasculature might have contributed to the severe complication occurrence. Fortunately, the patient promptly referred to the dermatologist, and adequate treatment was arranged. Adverse events often closely depend on the operator's expertise: only qualified medical doctors should practice tattoo removal, which is a safe procedure in the hands of an expert laser surgeon. The right choice of wavelength, fluence, or pulse width is crucial to

avoid causing dermal damage and long-term side effects. Moreover, parameter settings that work well and safely in one patient might be wrong in another, due to differences in the skin texture and pigmentation. There are also risks of treating a tattoo with too many pulses on a single occasion leading thus to a too-intense tissue reaction. Using too-high energy fluence and a too-large spot size increases the risk of deeper thermal injuries (4-8). Medical professional should be properly trained in laser physics, tissue interaction, safety, clinical application, as well as pre- and post-operative care of the laser patient.

Unfortunately, laser treatments are often carried out by non-qualified or poorly qualified staff, both medical and non-medical, at the expense of a safe and successful result. Moreover, many patients consider beauty therapists and other non-medical individuals to be remotely equivalent to medical aesthetic practitioners, risking their safety and underestimating the risks. When an adverse event occurs, the medical doctor is trained to solve or handle it, whereas non-medical practitioners might give up. In the presented case, thanks to the prompt treatment by a dermatologist, the skin injury healed without any other complication or sequelae. Dressing types are numerous: moist dressings, hydrogels, hydrocolloids, collagen wound dressings and antimicrobial dressings (9). The choice requires a great deal of experience in the field of wound healing, which is a branch well known to dermatologists, but which is suitable to other health-care workers application, requiring long-term interventions and treatment adjustments depending on single patient condition.

Conclusions

Education of beautician professionals is essential to avoid skin complications, often due to superficial training and inadequate medical basis. Dermatologists should contribute to improve applied cosmetology, providing best practices and encouraging research application. Appropriate dressing is crucial to promote healing and prevent infections. The role of the dermatologist is pivotal in treating wounds and ulcers to provide complete healing and prevent bad results such as scars or hypo/hyper-pigmentation.

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Acrylates nails sensitization

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Key words: *acrylates, nail cosmetics, sensitization, contact dermatitis*

Introduction

Since prehistory and across centuries, women used nail cosmetics to enhance their appearance, but ironically cosmetic techniques might cause anti-aesthetic and sometimes permanent nail changes (1). During last decades, long-lasting nail polish has been the most requested cosmetic nails technique and it has been responsible for most of both occupational and non-occupational allergic contact dermatitis (ACD) caused by acrylates. Acrylates are synthetic thermoplastic resins used in cosmetic procedures, in medicine, dentistry and several different industry field as well (2, 3). Because of growing number of acrylates ACD in all European countries, beauticians and patients should be aware about risks and consequences of their use, limiting sensitization and preventing exposures. Moreover, dermatologists should be familiar about cosmetic nail techniques and materials used, to easily recognise acrylates ACD, their complications and treat them (4, 5).

Case report

We present the case of a white woman, 40-years-old, who was used to wear acrylates nail tips covered by long-lasting nail polish from many years because of onychophagy. Patient came to our clinic because multiple eczematous, red to violaceus, painful lesions on the dorsal surface of fingers of both hands, had occurred ten days before (Fig. 1, 2). No systemic symptoms were present and personal and familiar history was negative for any allergic or autoimmune disease. In the

suspicious of allergic contact dermatitis (ACD) by acrylates, artificial nails were immediately removed and a treatment with oral steroid was necessary for complete resolution of cutaneous lesions and symptoms. After a few weeks, standard patch test were performed (Sidapa-Firma series) with integration of dust acaris, and "nails acrylates series", showing positivity for Nickel sulfate (+++), D.farinae (++), D. Pteronyssinus (++), Potassium dichromate (+), Propolis (+), Balsam of Peru (+), Dimethylaminopropylamine (+), but most of all the positivity for all acrylates tested (Fig. 3, Table I).

Fig. 1. *Erythematous-oedematous-vesicular, red to violaceus, painful lesions on the fingers of both hands.*

Fig. 2. *Nail reconstruction mixed technique with application of tip nails covered by long- lasting nail polish.*

APTENS	FIRST READING	SECOND READING
Triethylene glycol dimethacrylate 2%	---	+--
Hydroxypropyl methacrylate 2%	+++	+++
Ethylene Glycol dimethacrylate 2%	+++	+++
Hydroxyethyl methacrylate 5%	+++	+++
Methyl methacrylate 5%	++-	++-
Benzoyl peroxide 2%	---	+--
Ethyl cyanoacrylate	---	--+
Monobenzyl Ether of Hydroquinone	++-	+++
Hydroxyethyl acrylate 0.1%	---	++-

Table I. *Positivity to acrylates allergens.*

Discussion

Since the Bronze Age women used to decor nails with very different products and materials from henna and clay (ancient Egyptians) to egg whites, flowers and wax (ancient Chinese civilization), while artificial nails were used since 600 B.C. in China. But only in 17th century nails cosmetic became a fashion among women, leading to the first nail polish marketing in 1932, made up of pigments added to lacquer (1, 4). During the modern age several nails cosmetic techniques have appeared in cosmetic market, such as nails reconstructions (porcelain nails), long-lasting nail polish (also known as permanent o semi-permanent nails polish), adhesive nails, or mixed technique (gluing nail tip decor with long-lasting nails polish) (3, 6). Long-lasting nails polish appeared on the market on 2010, and nowadays it is one of the most requested technique that uses acrylates (3). Acrylates, methacrylates and cyanoacrylates are plastic materials that polymerize, spontaneously or in presence of UV light, forming very hard, dry and resistant resins (7). Monomers and dimers are highly sensitizer and responsible for most of contact allergic dermatitis (ACD) among beauticians, as a professional disease, and customers, especially since when at-home kit manicure has become popular. Moreover, acrylates are not only used in aesthetic procedures, but they are commonly used in multiple industrial field (plastics, paints, printing inks, compact discs, adhesive, bone cements, insulin pumps etc), dentistry (dental amalgams) and in medicine as well (contact and intraocular lens, protheses, surgical glues, etc) (5, 6).

Nails preparation and application of long-lasting nails polish could be a dangerous technique provoking onycholysis, nails weakness and irritant contact dermatitis after use of nail polish removers as acetone. Moreover UV-lamp use, especially for home use, might increase risk of potential carcinogenesis (4). But the most common reaction to long lasting nail polish is ACD, responsible for 67.3% of positive patch test reactions to acrylates. The first ACD caused by acrylates in artificial nails was reported in 1956. Nowadays, number of acrylates ACD are increasing in all European countries because of the diffusion worldwide of nail aesthetics among women of all ages (5, 6).

The acute phase of acrylates ACD, as in our patient, is characterized by edematous, exudative and itchy lesions on the skin around nails and periungual area (in workers is common on the first finger of the dominant hand), that later progress to dry, pain and fissured chronic pulpitis, acute o subacute eczematous lesions and sometimes blisters. It has been reported on the area of acrylates application mild paraesthesia, decreased sensibility, subungual hyperkeratosis, onychodystrophy and splinter haemorrhages, sometimes mimicking a psoriasis. The most common local area involved by acrylates ACD are tips, fingers and wrists. While cheeks, jewels, ears, lips, forearms, tights, abdomen and eyelids could be involved through an indirect passive transfer of acrylates. Moreover, airborne ACD and face involvement can occur because of inhalation of volatile monomers during polymerization, sometimes associated to mild symptoms of upper respiratory tract in absence of protective device (3, 4, 6). Monomers could pass easily through latex, vinyl and nitrile gloves and for that reason

it is recommended regular change of individual protections (5).

In suspicious of ACD, as we made to our patient, it is mandatory to apply patch test, including acrylates integration. Many acrylates cross-react and for that reason it is suggested to test only a limited number of acrylate allergens, in order to avoid sensitization and too strong positivity reactions. In some studies, it is reported that 2-hydrossiethylmethacrylates (HEMA) and 2-hydrosxypropylmethacrylates (HPMA) were able to detect mostly of ACD caused by nails acrylates, representing a good screening. Moreover, it could be useful the addition of Etyleneglycole dimethacrylate (EGDMA) to HEMA and HPMA in order to improve patch test sensitivity (6-9). EGDMA, that is present in every glue used to attach pre-formed nails, does not react with other methacrylate, but it could be a trigger for ACD (2, 5). Gonçalo et al. suggest test first HEMA and ethyl cyanoacrylate and only if these two allergens are negative to extend patch test to other acrylates as well (6).

Removal artificial nails is mandatory after diagnosis of acrylates ACD. Usually cutaneous lesions and symptoms improve after few days, but sometimes steroid and antibiotic treatment is required.

Conclusions

Acrylates nails could be a potentially dangerous cosmetic technique, both for costumers and workers, that in some cases might impact on quality of life and work. For that reason, we think it could be very important to train adequately beauticians to prevent exposure and sensitization, as well as protecting indirectly customers. Moreover, considering diffusion and growing use of acrylates nails in all European countries, it is not excluded that acrylate sensitization caused by aesthetic procedures, could impact on the use of these substances for medical purpose, as in orthopedic prosthesis, containing acrylates as well. By converse, dermatologist should become more familial with nails techniques, materials, and occurrence of skin lesions, to easily detect and treat complications.

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Infliximab-induced eruptive sebaceous hyperplasia in patient treated for ulcerative Colitis: first reported case

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Key words: *acrylates, nail cosmetics, sensitization, contact dermatitis*

Abstract

Multiple eruptive sebaceous hyperplasia (SH) is a well-known skin side-effect often occurring during cyclosporine administration, especially in kidney transplanted patients. On physiopatogenic basis, SH may be directly related to the cyclosporine induced immunosuppression, driving to dysplastic epithelial proliferation or may be an idiosyncratic consequence of cyclosporine effect like hypertrichosis. Nowadays, treatment with TNF alpha inhibitors is a cornerstone in a multitude of inflammatory and immune-mediated diseases like psoriasis hidradenitis suppurativa, arthritis, and inflammatory bowel diseases. TNF alpha inhibitors exert their activity on innate and adaptive immune system through immunomodulatory rather than immunosuppressive action, thus common side effects occurring during treatment with cyclosporine or another immunosuppressive agent are rarely described. Here, we report the first case of multiple eruptive sebaceous hyperplasia of the face, in a patient receiving infliximab for ulcerative colitis.

Case report

A 42-year-old Caucasian woman, was referred to our Clinic in December 2018 for the sudden development of skin eruption on her face, characterized by multiple, umbilicated, skin-colored asymptomatic papules (Fig. 1). She started to notice skin lesions two weeks before our

clinical observation and asked for dermatological consultation for aesthetic discomfort. Patients was in treatment with Infliximab 5mg/kg/ev every 8 weeks, following the induction phase with 5 mg/kg at week 0, 2 and 6, started in December 2017 for an Ulcerative Colitis (UC) resistant to previous treatment with sulfasalazine. Cutaneous lesions had developed 1 year after the first Infliximab infusion.

Infliximab had been well during the first year of administration without any relevant side effect, even if the patient had noticed a relapse of

Fig. 1. *Multiple sebaceous hyperplasia on the forehead, cheeks and chin.*

gastrointestinal symptoms one week before skin eruption development.

Clinical and dermoscopic examination of skin lesion reveal multiple sebaceous hyperplasia of the cheeks, nose and forehead. A successful treatment base on topical application of clindamycin 1% gel twice daily was obtained within for 20 days with almost total clearance of skin papules. In the meantime, a multidisciplinary consultation between dermatologists and gastroenterologists, for clinical revaluation of the patient drove clinicians to discontinued infliximab, and patient was switched to IL12-23 inhibitors.

No recurrence of skin eruption, or clinical relapse of UC were observed during the follow up period of 16 weeks.

Discussion

Sebaceous hyperplasia was originally described by Unna in 1874 as a yellowish or skin-colored papule located most commonly on the face (1-5). Dermoscopic examination detects the typical feature of a papule with central umbilication, corresponding to the glands' ostium (6). SH is generally observed in adults, and chronic immunosuppression related to cyclosporine A seems to increase SH prevalence by 10 to 30-folds in kidney transplanted patients7. Indeed, there have been several reports of multiple eruptive sebaceous hyperplasia in transplanted patients receiving cyclosporine, owing to its high cumulative dose (1, 8, 9, 10). So far, SH eruption occurring with cyclosporine therapy could be related to its activity on pilosebaceous unit, as demonstrated also for hypertrichosis, which is a well-known side effect related to cyclosporine; however, few cases of SH have been reported in other immunosuppressive conditions like bone marrow transplantation (11, 12), HIV infection during antiretroviral therapy (13) and, more recently, also in a patient affected by Crohn's disease taking high dose of oral corticosteroids (14).

The reported patient did not experience any previous treatment with cyclosporine, and eruptive multiple sebaceous hyperplasia occurred during the maintaining phase of infliximab treatment. Infliximab is a chimeric monoclonal antibody targeting TNF alpha widely used in rheumatoid arthritis, inflammatory bowel diseases, psoriatic arthritis, psoriasis and spondylitis. Dermatological side effects occurring with anti-TNF alpha therapies are well known clinical events (15) including paradoxical psoriasis, eczema, viral infections, alopecia, acne and, rarely, granulomatous dermatitis or hidradenitis suppurativa (16, 17). Psoriasis is a relatively frequent and intriguing condition, as infliximab in this scenario could act like a "janus bifron" by alternatively reducing/inducing the same disease has been prescribed for. It has already been suggested that the TNF alpha blockade could reflect into an overexpression of IFN alpha by peripheral dendritic cells resident into the skin, causing psoriasis riesacerbation. To date, our report is the first case of multiple eruptive sebaceous hyperplasia during anti-TNF alpha therapy in a patient affected by ulcerative colitis.

Conclusions

The reported case resizes the strict and exclusive link between SH and cyclosporine, making dermatologists aware about the risk of SH development in course of other drug-induced immunosuppressive conditions. Further studies are needed to clarify both humoral and cellular immune pathways involved in multiple eruptive sebaceous hyperplasia, particularly now, in the so called "molecular target therapy era" characterized by the widespread use of these therapeutic agents.

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Cosmetic oncology: innocent mole or malignant melanoma? Subjective assessments, objective semiology and aided diagnosis

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Abstract

Dermoscopy is a well established non invasive technique which allows the clinician to confirm his/her early diagnosis of so called "early melanoma". In several cases "early melanoma" is difficult to recognize versus innocent moles. In this position paper experts in the field of melanoma compare the personal diagnostic "eye-brain system" versus the dermoscopic imaging combined with the computerized pattern analysis of pigmented skin lesions. Digital image processing pattern recognition seems to be presently a reliable tool for aiding doctors in differentiating innocent moles versus the "early melanoma of the skin". The Medical Devices equipped with Artificial Intelligence should however rely on peculiar measurements extracted by the pattern analysis in order to provide the objective motivations of a diagnosis to clinicians and not simply based on image matching recognition. Experts need the motivations of a potential diagnostic aid.

Introduction

Beauty marks (also named beauty spots) are common spots usually located on the face and on the whole skin surface. Malignant melanoma can easily mimic pigmented beauty marks or non-pigmented beauty marks (achromatic cutaneous and mucous melanoma). In this position paper the authors suggest that the digital image processing algorithms represents the most reliable diagnostic technique for the first screening and the eventual subsequent detailed analysis. All cosmetic doctors should become familiar with the digital imaging processing methods oriented to the pigmented cutaneous lesions recognition and description.

Dermoscopy is a non-invasive analysis technique that allows the early detection of melanoma through the visual inspection of cutaneous subsurface structures of Pigmented Skin Lesions (PSL). This technique represents a tool to increase the clinical low sensitivity performed by the naked eye (1-5).

A skilled clinician is capable of recognising a huge number of features on the base of experience and known examples; his common sense leads him to the difficult process called "early diagnosis". Here we must underline the importance of the term "early" because the "late" diagnosis is not useful; this recognition could simply be performed by non-expert clinicians by means of the naked eye. The prominent role of experts is to provide the "knowledge" for the image interpretation and the rationalization of the thought process that leads from the image to the diagnosis. This knowledge, in the domain of Artificial Intelligence (AI), is called "Training Set" and similarly to the human brain a machine correlate the unknown cases to this given set. It is however important to understand if this set is based on the images, leaving a machine to do the stuff, or it is based on images and measurements based on peculiar features defined by experts in order to provide also a diagnostic motivation.

The human processing of the diagnosis begins with the patient's and lesion's history, the clinical

and dermatoscopic inspection, proceeds with the brain and, of course, ends with a response to colleagues and/or patients. Moreover, we must consider that the diagnostic accuracy increases when the diagnosis is performed in-vivo (6) so we eventually should rely on real-time computerized analysis.

ABCD rule and dermoscopy

Dermatoscopy is widely used in the clinical diagnosis of PLS. A very important and often overlooked problem in the dermoscopic field is represented by the unambiguous definition of significant features, which is actually performed by expert clinicians. On one side, there are difficulties due to subjective perception's laws: each clinician has his own individual perception of shapes and colors so we must consider any "rigorous definition" a sort of "flexible tool". On the other side, there are semantic problems arising from certain primitives of language which are difficult to be standardized and described with unambiguous delineation (6, 8).

A well-known method arose many years ago with the ABCD paradigm developed to teach patients and students (and not clinicians) to observe their own lesions at home: still today Asymmetry, Irregular borders, Dark colors and large Dimensions help to suggest patients to go to the specialist for further examination. The ABCD rule in dermoscopy, an evolution of the traditional method, reports some limits and also when used by experts in dermoscopy may fail on small melanocytic lesions (7) and should be considered secondary for the pigment network analysis (12).

Expert clinicians do not use crispy rules: they look globally at the lesion and then observe, instantly, a huge number of detailed features following the dermoscopic criteria based upon analysis of textures, color shades, and colors clusters. An expert clinician is able to process in his brain a large amount of data and, following long experience and common sense, the diagnosis is generally performed with good sensitivity and specificity (6). The literature reports values among (80% - 95%) for sensibility and (70-85%) for specificity.

Artificial intelligence

The human perception can be surely improved by AI based filters (figure 1), based on histogram equalization and training set parameters, in order to enhance peculiar features. One study reported improved sensibility by 10% while keeping the same value of specificity (15). This diagnostic process along with the patient's anamnesis and the history of the analyzing lesions offers a reliable tool for the diagnosis.

Algorithms and rules based methods have been reported to be really useful for teaching and providing a sort of flow-chart to non experienced dermatologists (6). Using them as a diagnostic tool in a daily routine, however, we are slightly

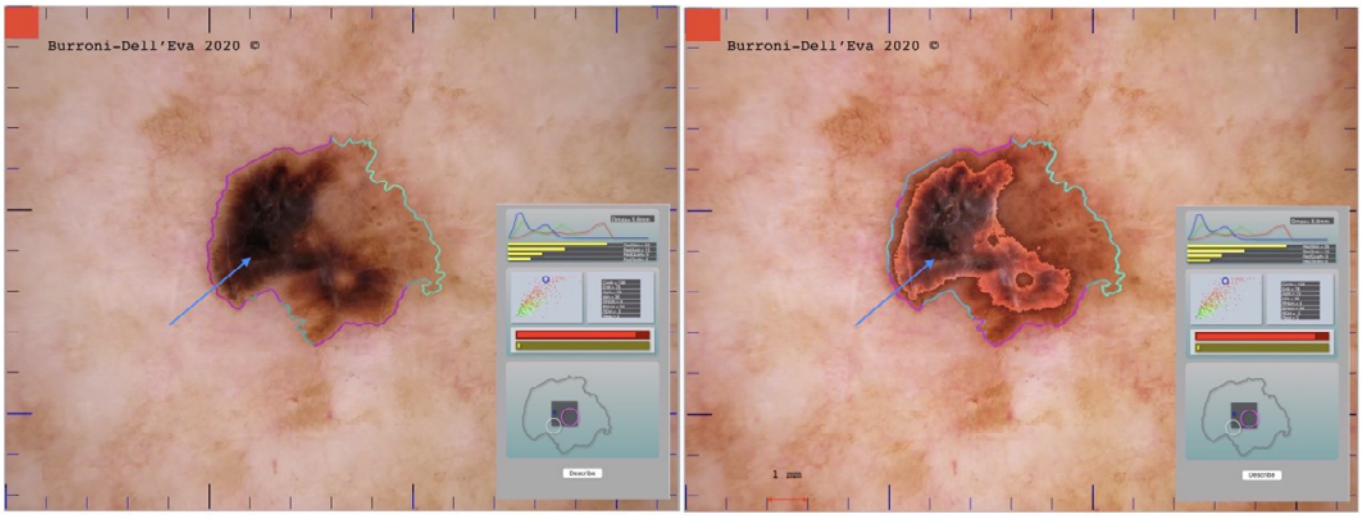

Fig. 1. *A screen-shot of the Islands Filter able to enhance the darker areas (blue arrow) and the related color shades in order to make them more visible to the clinician's perception.*

moving towards a mechanistic model that can be efficiently implemented by using computerized analysis. In addition, we have to take into strong consideration the evaluation of the intra-observer agreements of many visual features: the first variability in subjective definitions is due to the human perception's limits; the second variability is due to the difficult process of understanding the other's definitions caused by language standardization problems (6,8).

Some limitations of the subjectivity

The lack of standardization of terms and the objective limits in the perceptual ability of human beings leads to lower intraobserver agreements as reported in some studies (14, 17) based mainly on shared images and not on the in vivo inspection. The human brain tends to make rules on the basis of subjective impressions, sometimes based on unreproducible terms and tends to accept exceptions to rules basing on heuristic exclusions. The subjective assessment performed by the algorithmic methods is obviously subject to a highly reduced membership assignment continuing, at the same time, the reproducibility problems. An important task in the diagnosing process is the expenditure of time required for each "subjective" examination by rules: when a clinician observe a patient he performs instantly the selection of the lesions to be deeply examinated. This is a crucial task toward the needing of a real-time instrument as an aid specially in case many moles need to be examined. And, in case of (controversial) improvement of the diagnosis in the hand of non-expert clinicians, we maybe could use the common sense added to a computerized aided suggestion by means of reliable measurements of patterns starting from the traditional image processing methods (13) and their modern evolutions.

Progress by artificial intelligence

In order to overcome some of the aforementioned problems, focusing on dermatologists, some peculiar objective variables have been defined in order to evaluate both colors and color's clusters inside the lesions, i.e. "Islands of Colours" (9), experimenting later this new semiology providing a correlation with the clinical observation over atypical moles and early melanomas (10). The motivation of this path was suggested by the fact that medical devices should explain the reasons of a diagnosis through variables easy to be understood by clinicians. The perception laws and the cultural differences are creating a big gap not to be solved by the human eye-brain system. The main factor in the failure of some type of methods respect to the high accuracy revealed in the reality by the same experts who designed them is, that the PSL are natural objects with all the natural variations that life gives to things and simple descriptive rules create overlapping regions in the lesions classifications leading to "catchy" definitions instead of a complete and fluid complex diagnostic path. The human brain gives to a reconstructed image the right colors and the right meaning on the basis of previous experiences: this is a well-known aspect of the human perception called "visual memory law". The state of the art of the computer analysis permits not only the unambiguous mathematical definitions of terms, but mainly the automatic features evaluations leading to computerized aided suggestions.

It has been tested through a daily-routine based multicenter study that computerized aided differentiation of melanoma from other benign lesions is feasible and reliable (18). In the cited study two different departments were equipped with integrated systems (DB-Mips© Dell'Eva-Burroni), owning real-time AI engines: clinicians used the Systems in 4 years of daily routine inspecting the patients in-vivo. Subsequently the images and the related measurements, as automatically evaluated by the machine in the hands of clinicians, were collected and the results verified through a traditional statistical approach. The inevitable bias was caused by the necessity of exploring only the histology-proven lesions. It should be considered however that the analyzed lesions were eventually more difficult to be diagnosed respect to those not removed leading in the aforementioned study to a higher percentage of false positives respect to the reality and not viceversa. The study considered the flat pigmented lesions to be diagnosed by dermatoscopy. The "reliability study" indicated a mean sensitivity of 97% with a mean specificity of 75% of the integreted classifier and this result were confirmed by the statistical comparison of the same data. This approach took into strong consideration the real-clinical environment: it was not a subsequent processing of images but the analysis of those objective variables extracted by the machines during the examinations by clinicians in the routine.

The process of digital "image understanding", which refers to the techniques used to "teach" machines to recognize something, began many years ago by many research groups and continues with promising results even if the results may differ among different devices on the base of the kind of the adopted technology and the studied populations.

Artificial intelligence: pattern analysis and classifiers versus deep learning

The so called "AI" can be trained in several ways. We are reporting here the two currently used approaches.

One kind of Artificial Intelligence works by using the pattern analysis and proper classifiers based on peculiar measurements as reported in the aforementioned approach. The software evaluates from the examined lesions proper patterns defined by experts and then learn to recognise lesions from a traning-set built over these features (Figure 2). In this kind of approach clinicians know the objective motivations of a diagnosis based on pre-defined features of a mole. Using this technology doctors know the motivations of a machine's output. Moreover it is possible to perform statistical analysis in order to objectively describe different classes of pigmented lesions: the morphological features, when measured, can improve the understanding of the visual structure of the pigmented lesions.

The Deep Leaning approach, instead, is using a set of images leaving the machine to do the analysis by itself usually basing on Convolutional Neural Networks. Unlike the more traditional vision software, where programmers define objective rules, in deep-learning the algorithms find the rules by themselves but don't explain the decision. In recent years the use of the "Deep Learning", is actually rising many questions related to the lack of motivations of the diagnoses to clinicians.

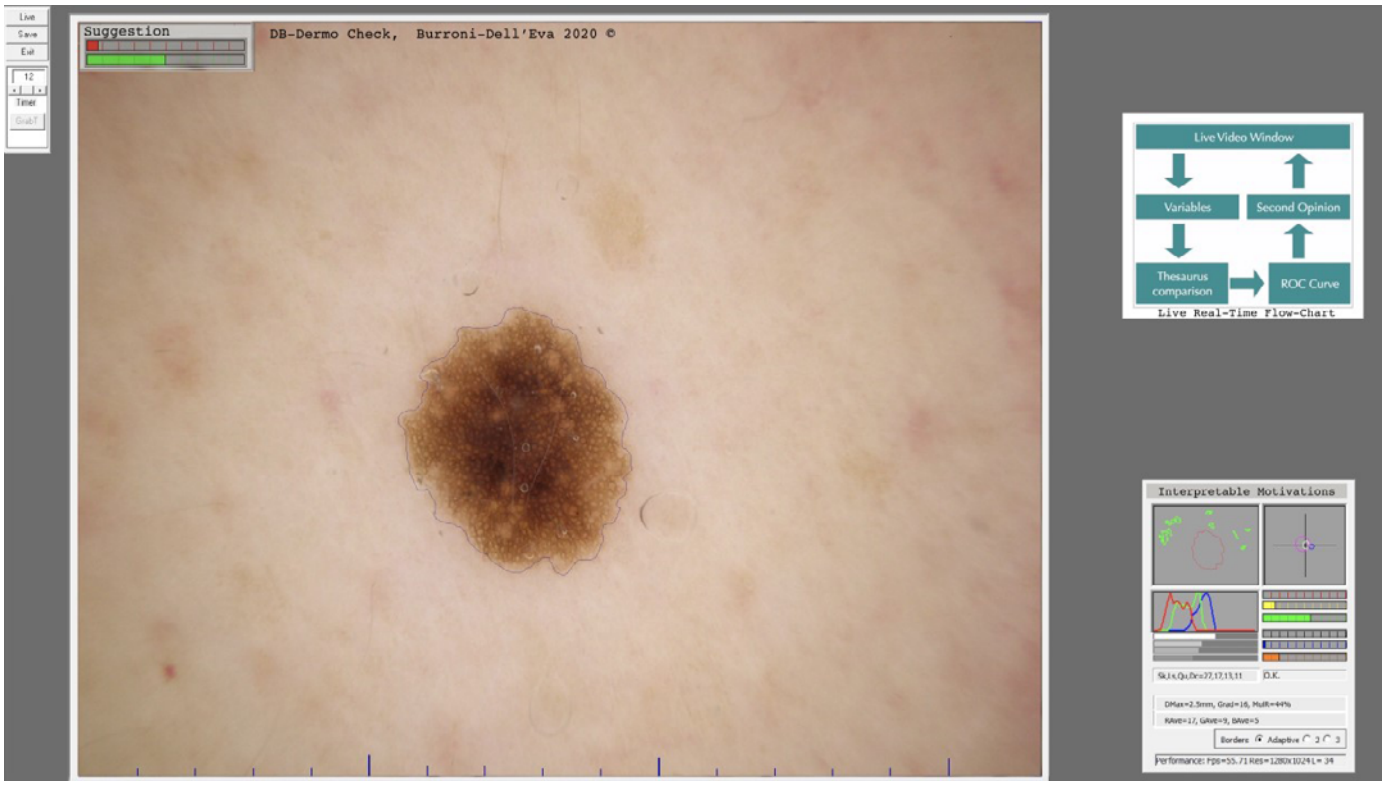

Fig. 2. *The image grabbing process of an Artificial Intelligence System of a Benign Naevus. The image's parameters are evaluated in real-time during the live inspection and compared with the training-set providing an aid (suggestion of risk probability). The peculiar parameters, used by the classifier, are shown on a proper window containing interpretable charts and measurements. The differential diagnosis during the live inspection is shown through horizontal bars in different colors. The Image and the related measurements are stored along with the Patient's database containing exaustive informations and total body photos.*

Cynthia Rudin, Professor of computer science at the Duke University, in a recent paper published on Nature, warns the use of Black-Boxes in "high stakes" fields (19). We should take into consideration the target and then decide which kind of aid is needed, providing interpretable results or not, on the base of the user's experience.

Discussion

It has been widely predicted that, over the next decade or two, biology will go completely quantitative. Medicine is following the same route. All modern measurement devices, from electrocardiograms to CAT scans or magnetic resonance images provide quantitative results and, unless we envision a future role of the clinician as a calculating machine, computerized analysis of results is the obvious consequence. Machines will never replace clinicians with their common sense, but clinicians may benefit by utilizing machines making complex calculations and providing interpretable motivations. The advantage in the daily routine could rise from using computers and peculiar measurements equipped with proper Patients database knowledge in the hands of dermatologists.

The use of the traditional pattern analysis method cooperating with a well-trained "objective based" machine seems to be actually a reliable tool. Dermatologists perform the diagnosis of a lesion using their experience, the touch, both patients and lesion's clinical history, then the naked eye inspection and finally a thorougly dermatoscopic examination. Recent reviews demonstrate how the in-vivo inspection of patients increase the diagnostic accuracy (6) and in the daily routine the need of real-time machine tools is almost evident. The actual debate refers also to the need of using interpretable models, in this case based on the pattern analysis and classifiers (18), instead of other models (19).

Conclusions

In our opinion clinicians need the diagnostic reasons explained, or to be clear, a motivation-based diagnosis performed on the same variables used to teach the training set. A modern device can be able to assist clinicians in selecting the suspicious lesions and then deliver a robust aid to them through a deeper analysis of the objective interpretable semiology. The keywords and the sense of this paper is objectivity, aid and interpretability in the hands of physicians.

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Opinions, perceptions and misconceptions about acne vulgaris: A cross sectional, survey-based study among young adult patients

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Abstract

Objective: To evaluate opinion, perceptions, and misconceptions about acne vulgaris in patients suffering with it. **Material and methods:** In this cross sectional study, patients with acne vulgaris were administered a questionnaire consisting of 28 questions related to occurrence of acne, hygiene and self-care, relationship with food items, treatment, stress and sleep, sexual activity and others. Dichotomous answers of these questions were rated by the study participants as "Yes" or "No". Responses are summarized as number and percentages. **Results:** Five hundred seven patients [females 289 (57%)] were included. According to 359 (70.8%) patients, acne occurs only in teenagers. A total of 223 (44%) patients reported that acne occurs due to poor hygiene whereas 123 (24.3%) reported that washing face helps to clear acne. According to 163 (32.1%) participants, dandruff is a cause of acne. One hundred and thirteen (22.3%) participants believed that acne is contagious. According to 262 (51.7%) survey participants, food plays a role in the development of acne whereas 259 (51.1%) patients said acne is curable. According to 195 (38.5%) patients with acne, stress can cause acne. Twenty nine (5.7%) participants reported that masturbation causes acne. A total of 309 (60.9%) participants reported that constipation and acne are related to each other. **Conclusion:** Several myths exist among patients with acne vulgaris. Collaborative efforts are required to educate patients and improve awareness about acne.

Introduction

Acne is one of the most common skin conditions encountered by dermatologists in their clinical practice. The disease occurs due to blockage of sebaceous glands followed by colonization with bacteria Propinobacterium acne (1). This disease of pilosebaceous unit is multifactorial with complex pathogenesis (1-4). Several internal and external factors are known to have impact on the condition (4).

Considering the common occurrence of condition and multi-factorial nature of the disease, various myths related to acne are prevalent in general population as well as patients. Several articles on misconceptions/myths about acne vulgaris have been published (5, 6). The myths may be related to the cause, aggravating factors and treatment of acne. Some of the areas of myths include diet, role of sunlight and face washing (7).

By falling prey to the myths, many patients with acne vulgaris may tend to resort to non-scientific advices given by their peers, friends and families which do not help to improve condition. In fact, in some cases, the wrong advice may have adverse implication on the condition. Therefore, it is essential to understand the perceptions and myths about the disease among patients with acne vulgaris. Better understanding of myths can help to counsel the patients more efficiently. This may have positive impact on the adherence to the treatment and hence outcome of the condition. Despite of availability of resources for knowledge and awareness, stereotypical misconceptions persist. The objective of this study was to evaluate opinion, myths and perceptions about acne vulgaris in patients suffering from this condition.

Material and methods

In this survey-based study, we evaluated perceptions and myths about acne vulgaris. A questionnaire consisting of 28 questions was administered to consecutive patients with acne vulgaris presenting to outpatient department of a tertiary care teaching hospital in western Maharashtra, India. The questionnaire consisted of questions related to beliefs, perceptions and common myths about acne. The questions were related to seven different aspects related to acne; occurrence (1 question), hygiene and self-care (9 questions), food items (5 questions), treatment (5 questions), stress and sleep (2 questions), sexual activity (3 questions) and others (3 questions). Answers to these questions were rated by the study participants as "Yes" or "No". Responses to questions were collected and summarized as number and percentages. The study was approved by institutional ethics committee.

Results

A total of 507 patients [females 289 (57%) and males 218 (43%)] were included in the study. According to 359 (70.8%) patients, acne occurs only in teenagers.

Perceptions about hygiene and self-care in patient with acne vulgaris

A total of 223 (44%) patients reported that acne occurs due to poor hygiene whereas 123 (24.3%)

reported that washing face helps to clear acne. Sweating and facial can help to improve acne, according to 40 (7.9%) patients each.

According to 163 (32.1%) participants, dandruff is a cause of acne whereas 68 (12.4%) believed that infrequent shampooing is related to acne. One hundred and thirteen (22.3%) participants believed that acne is contagious. Shaving and self-rupturing of lesions can improve acne, according to 33 (6.5%) and 66 (13%) participants respectively (Table I).

Parameter	Result N (%)
Occurrence of ace	
◦ Acne occurs only in teenagers	359 (70.8%)
Hygiene and self-care	
◦ Acne occurs due to poor hygiene	223 (44%)
◦ Washing of face helps to clear acne	123 (24.3%)
◦ Sweating helps to clear acne	40 (7.9%)
◦ Facial can improve acne	40 (7.9%)
◦ Dandruff is a cause of acne	163 (32.1%)
◦ Shaving can improve acne	33 (6.5%)
◦ Self-rupturing of lesions can improves acne	66 (13%)
◦ Acne is contagious	113 (22.3%)
◦ Infrequent shampooing is related to acne	68 (12.4%)
Stress and sleep	
◦ Stress can cause acne	195 (38.5%)
◦ Adequate sleep can improve acne	95 (18.7%)
Sexual activity	
◦ Acne is related to excess sexual activity	12 (4.3%)
◦ Masturbation causes acne	29 (5.7%)
◦ Acne is related to no sexual activity	27 (5.3%)
Others	
◦ Acne is improved with sun exposure	43 (8.5%)
◦ Acne is just a cosmetic condition	174 (34.3%)
◦ Constipation and acne are related to each other	309 (60.9%)

Table I. *Myths and perceptions about acne.*

Relationship of acne vulgaris with food items

According to 262 (51.7%) survey participants, food plays a role in the development of acne. A total of 146 (28.8%) patients reported that consumption of non-vegetarian food causes acne whereas 304 (60%) mentioned that spicy or oily food causes acne. Excess consumption of tea/coffee and chocolates is responsible for development of acne according to the opinions of 82 (16.2%) and 52 (10.3%) patients respectively (Fig. 1).

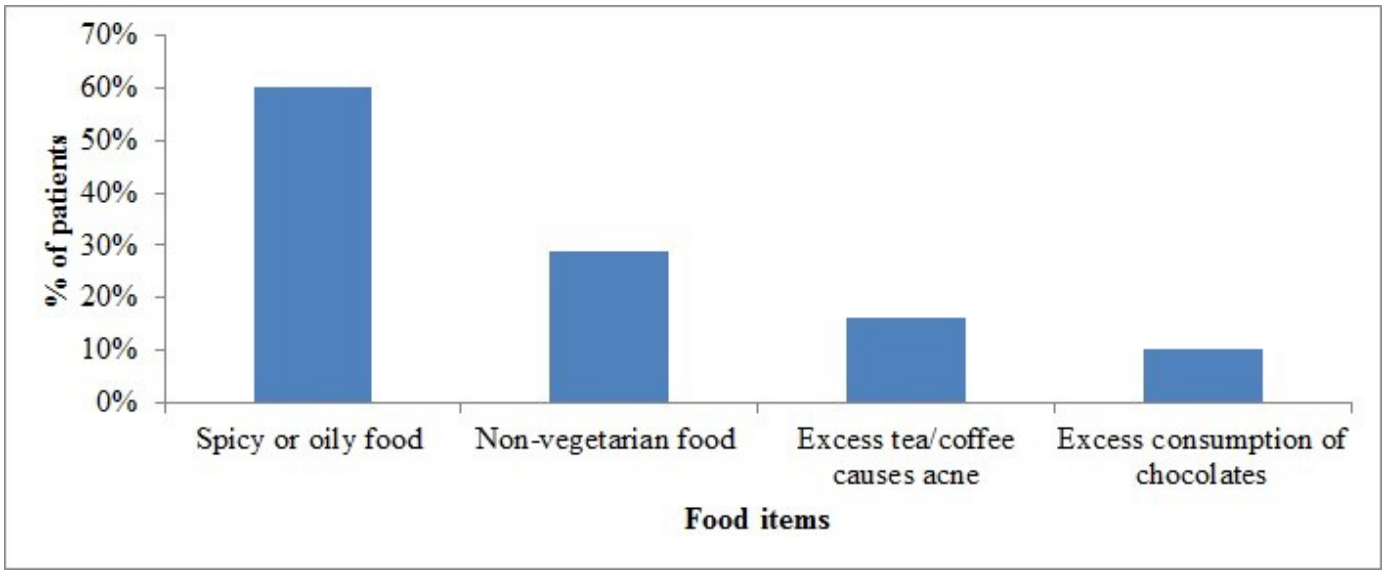

Fig. 1. *Food items implicated in the pathogenesis of acne.*

Perceptions about treatment of acne vulgaris

According to 259 (51.1%) patients' acne is curable. Spot treatment and over the counter products are useful in the treatment of acne according to 115 (22.7%) and 65 (12.8%) participants respectively. A total of 72 (14.2%) survey participants mentioned that acne heals on its own. As per the opinion of 161 (31.8%) participants, patients with acne should not apply moisturizers of cosmetic agents (Fig. 2).

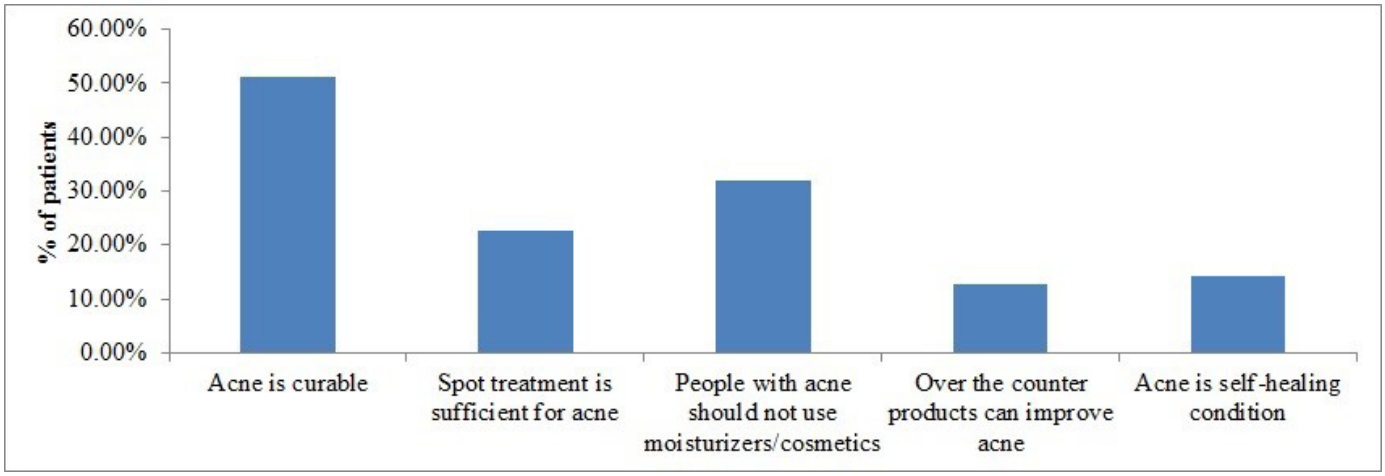

Fig. 2. *Perceptions about treatment of acne vulgaris.*

Relationship of acne vulgaris with stress and sleep

According to 195 (38.5%) patients with acne, stress can cause acne whereas 95 (18.7%) reported that adequate sleep can improve acne.

Acne vulgaris and sexual activity

According to 12 (4.3%) survey participants, acne is related to excess sexual activity whereas 27 (5.3%) reported that it is related to no sexual activity. Twenty-nine (5.7%) participants reported that masturbation causes acne.

Other perceptions about acne vulgaris

A total of 309 (60.9%) participants reported that constipation and acne are related to each other. One hundred seventy-four (34.3%) participants said that acne is just a cosmetic condition. According to 43 (8.5%) participants acne is improved with sun exposure.

Discussion

Acne vulgaris is a multi-factorial skin disease with complex pathogenesis with involvement of several factors (3). This common disorder is associated with several misconceptions among general population and patients. These misconceptions are mainly related to nature of the disease, treatment, diet and hygiene (5). Understanding and addressing beliefs of patients is important, otherwise despite prescription of suitable treatment, patients may not adhere to it, affecting outcome of the disease. We investigated prevalence of common misconceptions among patients with acne.

Acne is one of the most common skin conditions among teenagers (1). Acne is also common among adolescents and young adults (8). In our study, large number of participants believed acne vulgaris occurs only in teenagers. However, the condition does not only affect this age group. This myth needs to be addressed by patient education. Hygiene has been discussed as one of the factors in aggravation of acne (7). Many patients have reported poor facial hygiene as a factor to aggravate acne (9). Contrary to the opinion of participants in other study about role of sweating in the aggravation of acne (10), few patients in our study mentioned it can help to reduce acne. Other misconceptions/myths related to acne include its contagious nature, role of dandruff in causing acne and self-rupturing of lesions can help to improve acne.

Considering role of diet in acne, there is raising interest about medical nutrition therapy in the management of acne (8). Relation of diet with acne is being discussed by several researchers (3, 11), however, relationship between two is controversial (12). There may not be direct association between diet and acne (4). However, diet with high glycemic load have been implicated in the exacerbation of acne. Weak association of dairy products and acne is also suggested (3). Chocolate have been in discussion as factor contributing to disease exacerbation, but there is no strong evidence to support this (3). Fatty food and sweets are also been suggested by participants in other study to have a role in aggravation of acne (10). In our study, spicy or oily foods were implicated in aggravation of acne

by large number of patients. Non-vegetarian food was claimed to be second most common food item for causing acne. Tea/coffee and chocolates were also reported to cause acne by few survey participants.

Acne has significant impact on the quality of life (8, 13). The condition may be cause psychological stress in some people (2, 14). It is understood that more severe the condition more would be the stress, suggesting correlation between two. A study has shown positive correlation between stress and acne severity (15). Acne, especially severe cases may have psychological disturbances such as increased risk for the development of anxiety and depression (16). We feel, patients with acne, especially moderate to severe cases should be effectively counselled and familiarized with stress reduction techniques. Furthermore, it is worthwhile to conduct research through well designed studies to evaluate effect of lifestyle related parameters such as sleep and exercise on stress in patients with acne.

Skin disease may have effect on the sexual life of patients (17). Role of androgen is well established in pathogenesis of acne (18, 19). In most cases, acne present as individual symptoms, but in some patients, clinical features of hormonal disturbances especially hyperandrogenism may be seen. Androgens play a role in secretion of sebum (20) Acne can have adverse effects on self-perceived sexual attractiveness and self-confidence (17). Similarly, because of stress also these patients are likely to have less sexual intercourse (14). In our study, participants had mixed opinions related to role of acne and sexual activity, some relating relation of acne with excess sexual activity while few others having exactly opposite views. However, the percentage of study population relating acne with sexual activities was very less. Few people had opinion that masturbation causes acne. Although small number, such people should be educated about causes of acne.

In a study, 96% of acne patients reported that it is a curable disease and about two third patients believed that acne improves immediately after first treatment (21). Percentages of participants reporting both these findings are much higher than in our study.

There are many over the counter and prescription medicines for management of acne vulgaris (13). The treatment options include topical agents, oral antibiotics and isotretinoin are available for the management of acne vulgaris. Treatment of acne should be individualized based on several factors including severity and type of acne, consideration of the patient, and psychological status of the person. The treatment should be initiated at the earliest to reduce risk of scarring and adverse effects due to the condition (1).

Some of the topical treatment for example benzoyl peroxide or retinoid may be associated with adverse effect of skin irritation, hence some clinicians advise patients to use moisturizers as adjuvant treatment (22). Moisturizers may be of use to improve signs and symptoms of acne (22). In our study, about 32% patients were against the use moisturizers or cosmetics. It is difficult to analyse exactly how many were of the opinion of not using moisturizer as we did not ask a separate question about two.

Our study has some limitations. It was a cross-sectional survey with subjective opinions. Secondly, we did not compare opinions of study

participants according to age, gender, or other subgroups. Larger studies are recommended to confirm our observations.

Conclusions

Our study results suggest existence of several misconceptions and perceptions among patients with acne. These misconceptions are mainly related to hygiene, food and treatment of acne. Patient education and counselling should be an integral part of acne management to dispel the myths about acne. Effective counselling may help to improve adherence to treatment and outcome of the disease.

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