Original paper

The aggressive face of melasma: unveiling the influence of upper lip pigmentation on social perception

Marek Jankowski[1], Krzysztof Jasiński[2], Maria Płocka[3], Agnieszka Goroncy[2]

[1]Chair of Dermatology and Venereology, Faculty of Medicine in Bydgoszcz, Nicolaus Copernicus University in Torun, Poland
[2]Department of Mathematical Statistics and Data Mining, Faculty of Mathematics and Computer Science, Nicolaus Copernicus University, Torun, Poland
[3]Academia Copernicana Interdisciplinary Doctoral School, Nicolaus Copernicus University, Torun, Poland

Adv Dermatol Allergol 2024; XLI (2): 173–180
DOI: https://doi.org/10.5114/ada.2024.138678

Abstract

Introduction: Although melasma leads to emotional distress and quality-of-life reduction, indigenous cultures practice female facial tattooing. Facial cues influence personality trait inferences and attractiveness ratings. Skin lesions have been shown to alter gaze patterns, emotion perception, and social evaluations.

Aim: This study aimed to evaluate melasma's impact on visual attention, perceived attractiveness, and social evaluations, considering distinct anatomical areas. Additionally, we sought to compare perceptions of traditional facial tattoos due to their purposeful placement.

Material and methods: Gaze fixation patterns were examined via eye-tracking, and image-based personality questionnaires were completed for psychological trait assessment. Visual stimuli showcased anatomic melasma variants and tattoo patterns.

Results: Traditional tattoos often follow midline patterns, sparing the upper lip. Both melasma and tattoos significantly affected visual attention ($p < 0.001$), with chin and upper lip melasma garnering increased attention. Upper lip melasma decreased gaze to the ocular area ($p \leq 0.002$). while increasing perioral fixations ($p < 0.001$) compared to healthy faces. Upper lip tattoos conveyed increased perceived aggressiveness ($p = 0.004$). Ratings for attractiveness and personality traits were lower for centrofacial melasma than other variants, with no significant difference between centrofacial and isolated upper lip melasma.

Conclusions: The global avoidance of upper lip pigmentation underscores its perceptual burden. Upper lip pigmentation directs gaze towards anger-signalling regions, increasing perceived aggression and reducing attractiveness. Centrofacial melasma's impact parallels an isolated upper lip pattern, underscoring the disproportionate role of upper lip pigmentation. These findings warrant considering upper lip melasma's significant influence when evaluating quality of life and establishing treatment goals.

Key words: melasma, facial tattoo, quality of life, social perception, eye tracking.

Introduction

Melasma, one of the most common causes of acquired hyperpigmentation affecting mainly women, presents as symmetric reticulated hyperpigmented patches with irregular borders on sun-exposed facial skin. Sites of predilection for melasma include the malar area, upper lip, glabella and chin [1, 2]. A commonly used classification of melasma is based on this topography recognizing an additional centrofacial variant in which all mentioned areas may be affected. Melasma has a significant impact on facial appearance, and emotional distress, such as feeling bothered, embarrassed as well as unattractive [3], hence reducing the quality of life of the affected patients. Although the negative impact on quality of life is widely accepted, there are contradictory findings with regard to the correlation between the severity of melasma and disease-related quality of life [4–7].

Yet, purposedly inflicted pigmentary lesions in the form of female facial tattoos are found among various indigenous cultures worldwide with evidence of practice for at least two millennia [8]. The social context of facial tattoos varies across cultures, although most often facial tattoos served as rite-of-passage marks, markers of personal achievements, or cultural belonging. Interestingly, patterns of traditional facial tattoos often concentrate

Address for correspondence: Marek Jankowski MD, PhD, Department of Dermatology and Venereology, Faculty of Medicine, Nicolaus Copernicus University, 9 Sklodowskiej-Curie St, 85-094 Bydgoszcz, Poland, phone: +48 52 585 38 67, e-mail: yangcy@poczta.onet.pl
Received: 11.11.2023, **accepted:** 13.01.2024, **online publication:** 30.03.2024.

on midline areas, including the glabella, nose, chin, and malar area, while the upper lip is typically spared from tattooing, what may implicate negative attitudes toward upper lip pigmentation.

Humans make social evaluations instantaneously and human face is a major source for forming first impressions, and making fast and automatic attractiveness judgement and personality trait inferences. People attribute more desirable personality traits to more facially attractive individuals and several studies have indicated that facial skin health is a major factor in those evaluations with healthy faces perceived more attractive [9–11]. On top of that, perception of attractiveness is bidirectionally correlated with perceived emotional expression [12, 13]. Recent evidence suggests that symptoms of acne shift gaze patterns to facial areas critical for emotion recognition and affect perceived attractiveness and emotional valence in a manner dependent on the anatomical location of skin lesions [14].

Aim

The present study aimed to investigate impact of melasma on visual attention, perceived attractiveness, and social evaluation of affected individuals as well as contribution of particular anatomic areas to this effect. Traditional facial tattoos were also analysed for comparison due to their high visual saliency and intentional anatomic distribution.

Material and methods

Iconographic analysis of indigenous facial tattoos

Available scientific literature was searched for examples of indigenous female facial tattoos [15–20]. Representative tattoo patterns were superimposed as layers on a standard model face thus creating a density map where colour intensity represents relative frequency of tattooing of a particular anatomic area.

Participants

Eye-tracking study included 49 adults (18 males) aged 18–46 years (mean = 29.90 standard deviation (SD) = 7.91). Image-based personality questionnaires were filled by further 260 participants (41 males, aged 18–56 years, mean: 28.40 ±9.25).

Visual stimuli

Based on epidemiological studies [1, 2] we prepared visual stimuli depicting faces with five most distinct anatomical patterns of melasma which were: malar (MASI score = 2.88), glabellar (MASI = 1.56), upper lip (MASI = 0.4, and chin melasma (MASI = 0.56). Images of centrofacial melasma (MASI = 5) combined lesions of all four remaining variants. All images intentionally presented mild melasma. Each anatomical type of melasma was presented on four models. Visual stimuli depicting traditional Berber, Inuit and Māori facial tattoos in the glabellar and chin area were based on Fiksa [15]. The same tattoo patterns were used to generate stimuli depicting upper lip tattoo which were not practiced by those cultures. Each variant was presented on 8 models.

Eye-tracking procedure

Eye movements were recorded using the Gazepoint GP3-HD eye-tracker. Photographs were presented for 3 s each in life-size and a random order as previously described [21]. Areas of interest (AOI) representing glabella, perioral, upper lip with canine eminence, chin and periocular areas were marked for statistical analysis of visual fixations.

Image-based personality questionnaire

The study consisted of a screen-based questionnaire. To ascertain comparative attitudes toward images of clinical variants of melasma and facial tattoos respondents were asked to rate their perception of pictured individuals' personality traits (solely based on their visual impressions). Face stimuli were rated for trustworthiness, dominance, confidence, aggressiveness on a 5-point Likert-like scale and for attractiveness on a 10-point Likert-like scale. These traits have been selected based on previously identified impact on individual's romantic, economic, and career-related achievements as well as having valid ratability. The questionnaire was prepared in multiple versions so every melasma and tattoo variant would be presented on every model face without a recall bias.

Statistical analysis

Statistical analysis focused on two problems, concerning melasma and facial tattoos. For each of them we considered two issues, and we had two different datasets at our disposal: eye-gaze tracking data (n = 49 subjects, both for melasma and tattoos) and online surveys (n = 129 and n = 84, for melasma and tattoos, respectively). In all cases the variables in data were dependent, since for each respondent we collected multiple measurements at different levels of the variables of our interest. In the eye-tracking problem, i.a. numbers of fixations for various skin pigmentations and areas of the models' faces were recorded for each subject, while in the surveys the respondents rated the various facial pigmentation disorder on different model faces. For each dataset a separate statistical analysis was performed.

To examine whether the presence of analysed pigmentary patterns affect the mean number of gaze fixations to critical regions of the face, two-factorial (image type by anatomic part of the face – AOI) repeated measures analysis of variance (ANOVA) was conducted based on eye-gaze datasets with the number of fixations as the dependent variable. The data were appropriately restruc-

tured and aggregated so that for each subject, anatomic location of pigmentary lesions (image type) and anatomic part of the face (AOI) we used the means of fixations for all models, since not to all participants of the study all variants of models were presented on each image type.

In order to examine whether the presence of analysed pigmentary patterns affect personality trait ratings, we also used two-factorial (AOI by personality traits) repeated measures ANOVA based on survey results with the rating score as the dependent variable. Ratings obtained for attractiveness were divided by 2 to obtain the same scale range as for other personality traits.

All calculations and statistical procedures were conducted using the R environment (v4.2.2) and IBM SPSS Statistics (v28). Statistical tests were considered statistically significant if their respective *p*-values were less than 0.05. Details of statistical analyses are extensively described for the interested readers in the Supplementary file.

Results

Iconographic analysis

After eliminating duplicates 121 individual patterns of traditional facial tattoos were identified. Iconographic analysis revealed that facial midline, particularly glabella and chin are the most common anatomic locations for indigenous female facial tattoos. To the contrary, the periorbital area and upper lip area extending over canine eminence is typically spared from tattooing (Figure 1).

Eye-tracking analysis

The main effect of the image type was found to be significant both for tattoos ($F(3; 132) = 12.191$, $p < 0.001$, $\eta^2 = 0.217$) and melasma ($F(2.306; 101.449) = 28.511$, $p < 0.001$, $\eta^2 = 0.393$) which implies that faces with pigmentary lesions were differently perceived regardless of the area that attracted the attention. Images with chin tattoos attracted significantly more fixations than healthy reference images ($p < 0.001$). In this line, chin as well as upper lip melasma images attracted significantly more attention to the face in general compared to healthy faces ($p < 0.001$), while faces with malar melasma attracted significantly less fixations compared to healthy faces ($p < 0.001$).

The main effect of the anatomic location was also significant both for tattoos ($F(2.211; 97.3) = 27.410$, $p < 0.001$, $\eta^2 = 0.384$) and melasma ($F(2.266; 99.7) = 31.009$, $p < 0.001$, $\eta^2 = 0.413$), which means that irrespective of in which anatomic part of the face pigmentary changes were present, the mean number of fixations between areas occurred to be significantly different between anatomic areas. The chin area was found to attract significantly less fixations than remaining analysed areas irrespective of tattoo or melasma location ($p < 0.001$, for all variants). This is in line with a previous study (see [21]) which showed that the chin area falls within a low-attention cluster, while remaining analysed areas fall within a high-attention cluster.

Moreover, according to the ANOVA results, the interaction of the image type and area was found to be significant both for tattoos ($F(127.279; 2.474) = 51.443$, $p < 0.001$, $\eta^2 = 0.539$) and melasma ($F(30.106; 1.667) = 18.064$, $p < 0.001$, $\eta^2 = 0.291$), which implies that there are significant differences in mean fixations between parts of the face depending on the type of pigmentary changes and vice versa. See Figure 2 B for exemplary heatmaps of gaze fixations.

Presence of any analysed pigmentary patterns significantly decreased attention in the ocular area irrespective of its location ($p \leq 0.002$ for all image types) with no significant differences between locations (p from 0.153 to 1, for all image types except the norm) (Figure 2 A).

Both types of pigmentary lesions in the glabellar area increased attention to the homonymous area ($p < 0.001$ for all anatomic areas) and for tattoos such increase of attention had the greatest amplitude compared to normal images among all analysed anatomic areas and lesion types. Conversely, pigmentary changes in the glabella significantly decreased attention to the perioral region,

Figure 1. Anatomic frequency map of female indigenous facial tattoos. Representative tattoo patterns were superimposed as layers with 1% opacity on a standard model face thus creating a density map where colour intensity represents relative frequency of tattooing of a particular anatomic area

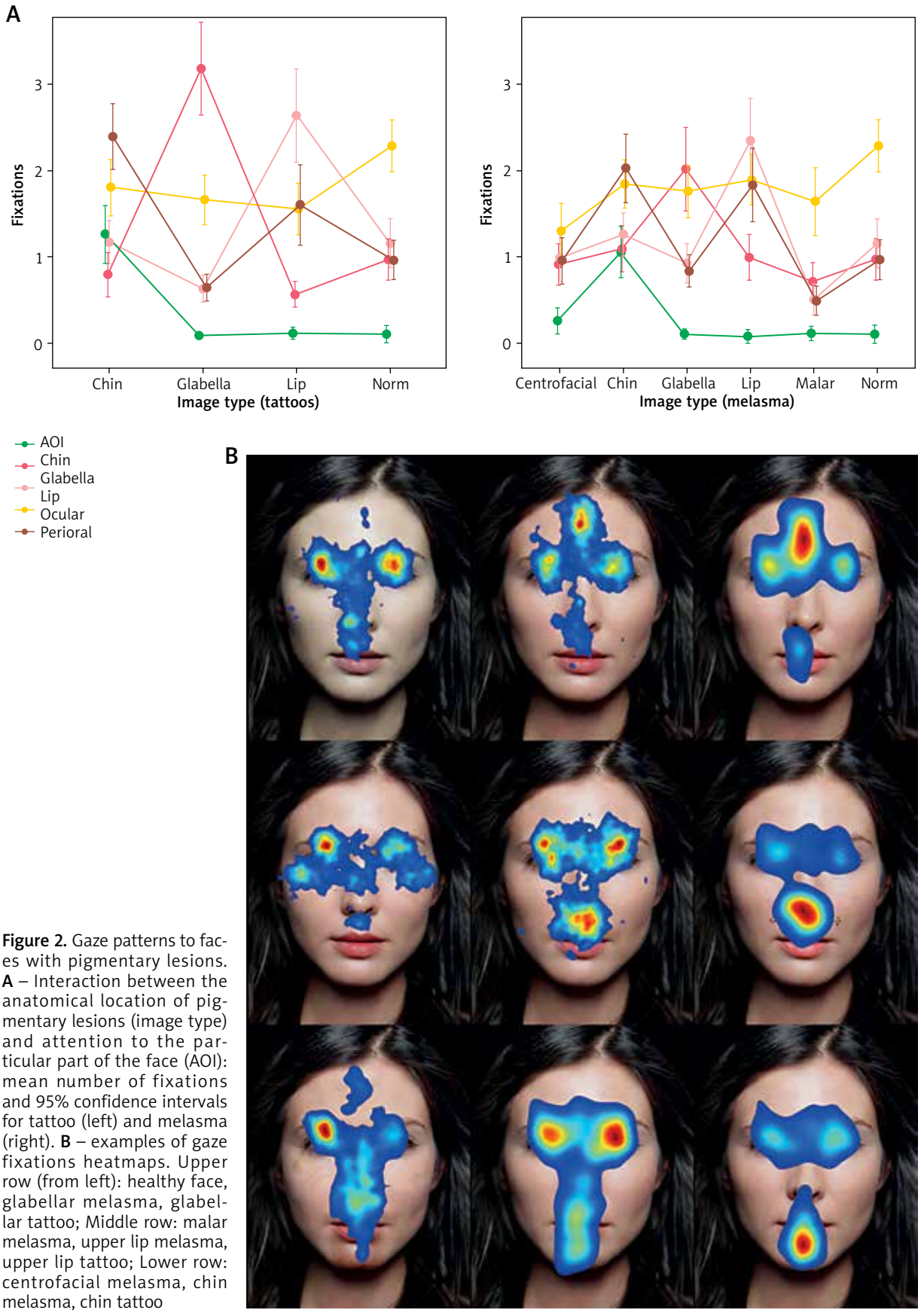

Figure 2. Gaze patterns to faces with pigmentary lesions. **A** – Interaction between the anatomical location of pigmentary lesions (image type) and attention to the particular part of the face (AOI): mean number of fixations and 95% confidence intervals for tattoo (left) and melasma (right). **B** – examples of gaze fixations heatmaps. Upper row (from left): healthy face, glabellar melasma, glabellar tattoo; Middle row: malar melasma, upper lip melasma, upper lip tattoo; Lower row: centrofacial melasma, chin melasma, chin tattoo

particularly to the upper lip area compared to healthy faces ($p = 0.002$ for tattoos, $p < 0.001$ for melasma).

Attention to the chin area was increased by pigmentary lesions in this region ($p < 0.001$). Moreover, chin tattoos and melasma significantly increased attention to the perioral area compared to normal images ($p < 0.001$) exclusively due to increase of attention to the lower lip area ($p < 0.001$) without affecting the attention paid to the upper lip ($p \approx 1$).

Upper lip pigmentary lesions attract more attention to the perioral area compared to normal images ($p = 0.025$ for tattoos, $p < 0.001$ for melasma), but this is mediated exclusively by increased attention to the upper lip ($p < 0.001$ for all image types).

Unlike chin and upper lip melasma, malar melasma significantly decreased attention to the perioral area ($p = 0.007$ for means between malar and normal images).

Even though centrofacial melasma involves lesions in the upper lip, yet we have seen no significant increase of attention to the upper lip ($p \approx 1$) nor perioral area in general ($p \approx 1$) in that type of melasma. In the same manner, despite the fact that centrofacial melasma presented to participants involved pigmentation in the glabella, yet we have seen no significant increase of attention to the glabellar region in that type of melasma ($p = 0.404$ compared to ocular AOI, $p \approx 1$ compared to the lip and AOI = 5,

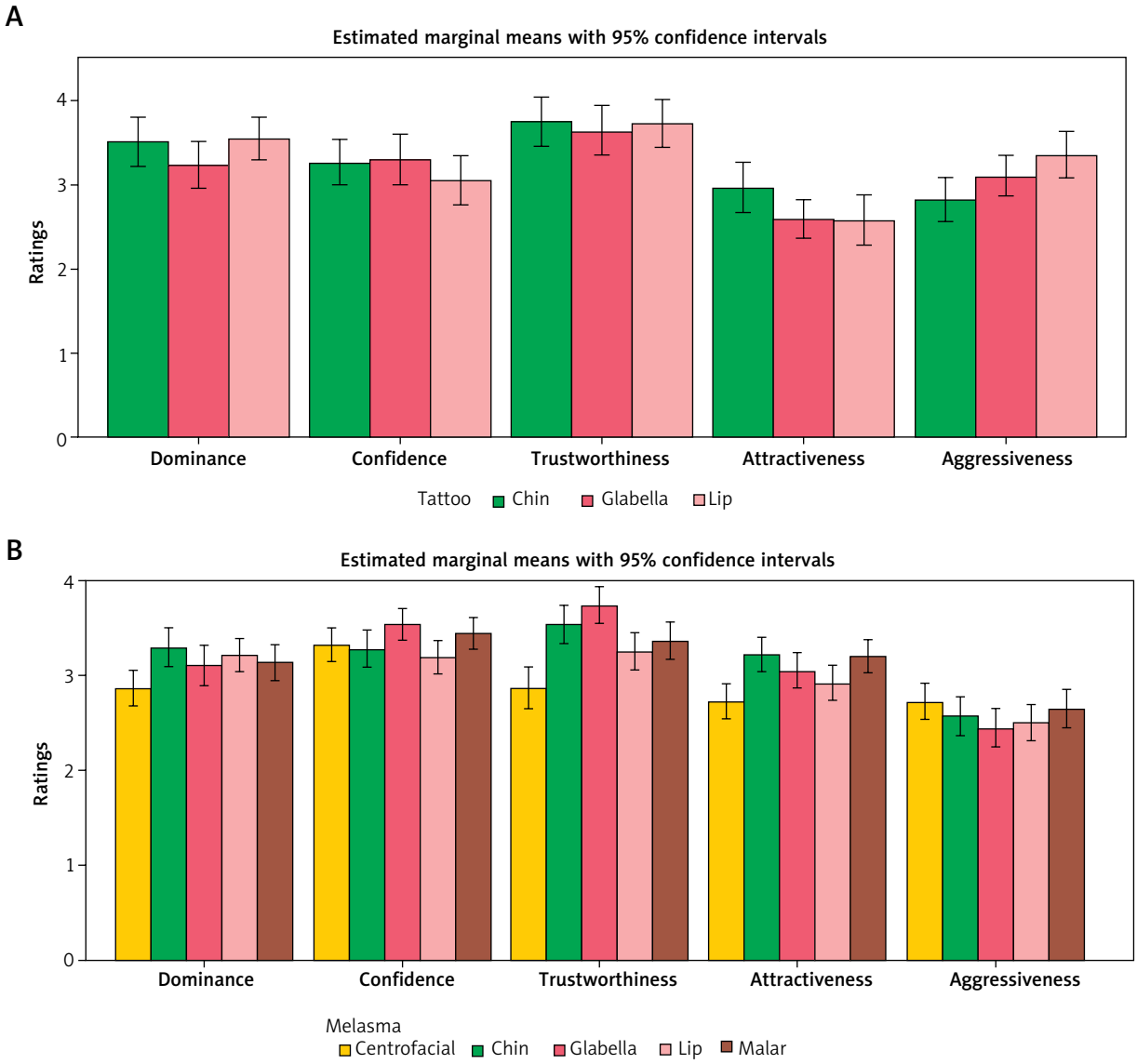

Figure 3. Interaction between the personality traits and anatomical location of pigmentary lesions (AOI): mean rating scores and 95% confidence intervals for tattoo (**A**) and melasma (**B**)

only compared to the chin area, there is a significant increase in the glabellar area: $p < 0.001$).

Personality ratings

The two-way repeated measures ANOVA indicates that the main effect of interaction of tattoo location and tested personality traits is significant ($F(7.138; 592.483) = 2.843$, $p = 0.006$, $\eta^2 = 0.033$), however the main effect of tattoo location alone did not reach significance ($F(2; 166) = 0.476$, $p = 0.622$, $\eta^2 = 0.006$), thus the pairwise comparison was not performed. Results for images of melasma indicate that the main effect of interaction of melasma location and tested personality traits is significant ($F(9.942; 1272.540) = 4.291$, $p < 0.001$, $\eta^2 = 0.032$), as is the main effect of melasma location ($F(4; 512) = 10.026$, $p < 0.001$, $\eta^2 = 0.073$).

To understand the nature of interactions between personality traits and anatomic area, the simple effects analysis was conducted, based on multiple comparisons with Bonferroni correction. Faces with upper lip tattoos were perceived significantly more aggressive (mean = 3.357) than chin tattoos (mean = 2.821; $p = 0.004$), however differences in aggressiveness perception were not significant for the upper lip and chin melasma ($p \approx 1$).

There was a trend towards increased attractiveness for chin tattoos (mean = 2.964) compared to the upper lip (mean = 2.577; $p = 0.189$), and glabella tattoos (mean = 2.589; $p = 0.055$) although it did not reach statistical significance. In case of chin and upper lip melasma the difference in attractiveness was significant. Moreover, ratings for attractiveness were significantly lower for centrofacial lesions than for malar ($p < 0.001$), chin ($p < 0.001$) and glabellar melasma ($p = 0.015$), however there was no significant difference for centrofacial and isolated upper lip melasma ($p = 0.178$) (Figure 3).

Ratings for confidence were significantly lower for centrofacial lesions than for malar ($p = 0.008$), chin, and glabellar melasma (with all $p < 0.001$), however there was no significant difference for centrofacial and isolated upper lip melasma ($p = 0.055$).

Faces with centrofacial melasma received poorest ratings on almost all psychologic traits compared to malar, glabellar and chin melasma. Again, ratings of faces with isolated upper lip lesions did not differ significantly from ratings of widespread centrofacial melasma pattern ($p = 0.254$).

Discussion

Presence of facial pigmentary lesions of melasma, is known to have a negative impact on quality of life. Yet voluntary pigmentation of the face in the form of facial tattoos is prevalent among indigenous cultures around the world. Iconographic analysis allowed us to identify published examples of female facial tattoos in 121 cultures. Traditional tattoos are most common in the midline area, particularly on the central forehead, glabella, nose, and chin, while the periorbital area and upper lip is tattooed relatively seldom. If the upper lip is tattooed, it is often in the context of a tattoo covering uniformly all of the lower face. Unlike melasma, which develops in sun exposed areas, pigment distribution in facial tattoos is customary and related to social perception. The cross-cultural trend for avoidance of pigmenting the upper lip including canine prominence implies particular burden to human perception and/or social interaction rendered by obscuring facial features in this area.

Global gaze fixation results indicate that both chin and upper lip pigmentary lesions attracted significantly more attention to the face in general compared to healthy faces, however no such increase of attention was reported for acne lesions in the same areas [14]. Possible explanation to this contradiction lies in differences of visual saliency with melasma and tattoos being significantly more visually salient than acne lesions. Another possibility is that acne lesions, being common in the studied population, require less cognitive processing than less common melasma or indigenous tattoos extraordinarily rare in Europe.

Although visual attention to the human face is an individually variable and task-specific trait, attention to the periocular and perioral areas is the highest in terms of both frequency and duration of eye fixation [22, 23]. These areas are particularly relevant for the decoding of emotional expressions. The association of shift in gaze pattern geometry due to facial skin lesion and disturbance in perception of expressed emotions has been recently reported [14]. All examined types of pigmentary lesions significantly decreased attention to the periocular area. Impact of melasma and tattoos on attention to the perioral area is more complex. Isolated malar and glabellar lesions decrease attention to this region, while upper lip and chin lesions increase it significantly. On top of that, no effect on perioral attention was seen for the centrofacial melasma pattern, which consists of all aforementioned patterns combined. The latter observation has implications for all eye-tracking studies as it highlights the existence of competing visual signals in complex visual patterns.

Increased visual attention to the perioral areas has recently been demonstrated for faces with an adult female acne variant [14]. The current study adds to this by further specifying the mechanism of visual attention to this region. While chin tattoos and melasma significantly increased attention to the perioral area exclusively due to increase of attention to the lower lip area, upper lip pigmentary lesions did so by increased attention exclusively to the upper lip. This clearly demonstrates that stomion and cheilons are not just anthropometric points but salient visual markers limiting saccades of gaze to the human face.

Of importance is also the fact that for images presenting with upper lip tattoos and melasma, a significant

number of fixations to the upper lip area extended to the canine eminence, where pigment was absent. The critical role of this anatomical region for culturally common signalling of anger and disgust has recently been identified [24, 25] and indeed, faces with the upper lip tattoo were perceived as more aggressive in our study. The influence of the upper lip pigmentation on aggressiveness perception is further corroborated by the fact that pigmentation in the upper lip rendered faces less attractive than pigmentation in other face parts. Attractiveness rating is known to be correlated with expression of emotions and angry faces are perceived as less attractive [26, 27]. Upper lip pigmentation seems to negatively impact attractiveness at least partially by rendering faces more aggressive. The question remains whether this increase in perceived aggressiveness is mediated by increased visual scrutiny or rather by pigmentation obscuring proper recognition of anger-demonstrating action units.

Noteworthy, ratings for attractiveness as well as ratings on all psychologic traits were significantly lower for centrofacial melasma compared to malar, chin and glabellar melasma, but not upper lip melasma. This finding not only emphasizes importance of the upper lip region in social perception but may also explain conflicting results on correlation of melasma intensity and melasma-related quality of life ratings [3–7]. Visual stimuli used in this study presented melasma of limited intensity with mean MASI score for centrofacial and upper lip melasma being 5 and 0.4 points, respectively. Yet despite 12-fold difference in melasma intensity between these two variants we found no significant difference in social perception. This observation indicates that pigmentation of the upper lip contributes disproportionally to the general impact of melasma on social perception, yet to the best of our knowledge, none of the published studies assessing melasma-related quality of life took anatomical location of melasma lesions into consideration.

Conclusions

Results of this study indicate that pigmentation of the upper lip induces a shift of gaze pattern geometry toward the area instrumental in expression and recognition of anger and contempt, rendering perception of the face as more aggressive and less attractive. This negative influence on social perception seems a plausible explanation for cross-cultural tendency to avoid pigmentation of the upper lip. The high impact of upper lip melasma should be taken into consideration while establishing treatment goals in order to achieve improvement in social perception rather just reduction of the lesion area.

Funding sources

None.

Conflict of interest

The authors declare no conflict of interest.

References

1. Tamega Ade A, Miot LD, Bonfietti C, et al. Clinical patterns and epidemiological characteristics of facial melasma in Brazilian women. J Eur Acad Dermatol Venereol 2013; 27: 151-6.
2. Legarda-Montinola F. Classification and clinical presentations of melasma in brown skin. In: Melasma and Vitiligo in Brown Skin. Handog E, Enriquez-Macarayo M (eds). Springer, New Delhi 2017.
3. Ikino JK, Nunes DH, Silva VP, et al. Melasma and assessment of the quality of life in Brazilian women. An Bras Dermatol 2015; 90: 196-200.
4. Jusuf NK, Putra IB, Mahdalena M. Is there a correlation between severity of melasma and quality of life? Open Access Maced J Med Sci 2019; 7: 2615-8.
5. Amar A, Nida S, Mudassir M. Effect of melasma on quality of life of patients using dermatology life quality index. Pak Armed Forces Med J 2022; 72: 1274-7.
6. Platsidaki E, Efstathiou V, Markantoni V, et al. Self-esteem, depression, anxiety and quality of life in patients with melasma living in a sunny mediterranean area: results from a prospective cross-sectional study. Dermatol Ther (Heidelb) 2023; 13: 1127-36.
7. Jiang J, Akinseye O, Tovar-Garza A, Pandya AG. The effect of melasma on self-esteem: a pilot study. Int J Womens Dermatol 2017; 4: 38-42.
8. Krutak L. Therapeutic tattooing in the Arctic: ethnographic, archaeological, and ontological frameworks of analysis. Int J Paleopathol 2019; 25: 99-109.
9. Zebrowitz LA. First impressions from faces. Curr Dir Psychol Sci 2017; 26: 237-42.
10. Dirschka T, Micali G, Papadopoulos L, et al. Perceptions on the psychological impact of facial erythema associated with rosacea: results of international Survey. Dermatol Ther (Heidelb) 2015; 5: 117-27.
11. Ballew CC 2nd, Todorov A. Predicting political elections from rapid and unreflective face judgments. Proc Natl Acad Sci USA 2007; 104: 17948-53.
12. Hartmann GC, Guimarães LK, Maggioni CG, et al. Social attractiveness perception of a cleft lip repair in an adolescent via eye-tracking. J Stomatol Oral Maxillofac Surg 2022; 23: e526-32.
13. Garrido MV, Prada M. KDEF-PT: valence, emotional intensity, familiarity and attractiveness ratings of angry, neutral, and happy faces. Front Psychol 2017; 8: 2181.
14. Jankowski M, Goroncy A: Anatomical variants of acne differ in their impact on social perception. JEADV manuscript 2023-2844.R1 in press
15. Fiksa R. Tribal tattoo encyclopedia. Bodyart Press, Praga 2021
16. Krutak L, Deter-Wolf A. Ancient Ink: The Archaeology of Tattooing. Univeristy of Washington Press, Seattle 2017.
17. Krutak L. The Tattooing Arts of Tribal Women. Bennett & Bloom, London 2007.
18. Deter-Wolf A, Diaz-Granados C. Drawing with Great Needles: Ancient Tattoo Traditions of North America. University of Texas Press, Austin 2013.
19. Caplan J. Written on the Body: The Tattoo in European and American History. Princeton Univ Press, Princeton 2000.
20. Leu A. Berber Tattooing: in Morocco's Middle Atlas. Seedpress, Dublin 2017.

21. Jankowski M, Goroncy A. Perceptive hierarchy of facial skin lesions: an eye-tracking study. Acta Derm Venereol 2022; 102: adv00799.
22. Kanan CKanan C, Bseiso DN, Ray NA, et al. Humans have idiosyncratic and task-specific scanpaths for judging faces. Vision Res 2015; 108: 67-76.
23. Rogers SL, Speelman CP, Guidetti O, Longmuir M. Using dual eye tracking to uncover personal gaze patterns during social interaction. Sci Rep 2018; 8: 4271.
24. Jack RE, Sun W, Delis I, et al. Four not six: Revealing culturally common facial expressions of emotion. J Exp Psychol Gen 2016; 145: 708-30.
25. Du S, Tao Y, Martinez AM. Compound facial expressions of emotion. Proc Natl Acad Sci USA 2014; 11: E1454-62.
26. Brewer G, Archer J. What do people infer from facial attractiveness? J Evol Psych 2007; 5: 39-49.
27. Mertens A, Hepp J, Voss, A et al. Pretty crowds are happy crowds: the influence of attractiveness on mood perception. Psychol Res 2021; 85: 1823-36.