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The Burden of Melasma: Race, Ethnicity, and Comorbidities

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ABSTRACT

Introduction: In an effort to define the characteristics of populations affected by melasma, we utilized a large global health research network database from 108 health care organizations (TriNetx) to quantify the associations between race, ethnicity, and comorbidities.

Methods: We identified the cohort of all patients with melasma from the TriNetx database, and subsequently generated a control cohort. ICD-10 codes were used to identify the prevalence of various comorbidities associated with melasma.

Results: A total of 41,283 patients with melasma (93% female, mean [SD] age 48.8 [12.6] year) were identified. The most frequently associated risk factors included hypertension (25% of the melasma cohort) and hormonal contraception (24%). Rosacea (OR=5.1), atopic dermatitis (OR=3.3), lupus (OR=2.5), history of skin cancer (OR=2.5), history of internal malignancy (OR=2.1), and hormonal contraception use (OR=2.1) possessed the highest odds ratios for development of melasma (all $P< 0.01$). A statistically significant association was identified for melasma in Asian or Other/Unknown races (OR=2.0 and OR=1.7, $P< 0.01$), as well as Hispanic ethnicity (OR=1.3, $P< 0.01$). White, Black/African American, and Not Hispanic groups all revealed slightly lower odds (all 0.8, $P< 0.01$).

Conclusion: This latest global update on the etiopathology of melasma further supports findings from prior epidemiologic study reporting preference in melanized phenotypes (Fitzpatrick skin type III-V), but less so in extreme skin types (I, II, VI). Increased associations with rosacea, atopic dermatitis, and history of cancer may emphasize the importance of treating concurrent inflammatory environments and the consideration of more frequent malignancy surveillance.

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INTRODUCTION

Melasma is a commonly acquired pigmentation disorder classically favoring young women of color or those with exacerbating factors, such as hyperestrogen states.[1] In this study, we utilized a large global health research network database from 108 health care organizations (TriNetx) to quantify the associations between race, ethnicity, and comorbidities with the prevalence of melasma. Through an enhanced understanding of those most prone to this dyschromia, dermatologists can better stratify potential surveillance and treatment plans.

MATERIALS AND METHODS

We identified the cohort of all patients diagnosed with melasma from the TriNetx database and subsequently generated a control cohort of age, sex, and race-matched patients without melasma. ICD-10 codes were used to identify the prevalence of previously reported comorbidities in both the melasma and control populations: allergic rhinitis, anticonvulsants, atopic dermatitis, diabetes, hormonal contraceptives, hypertension, hypothyroidism, lupus, malignancy, rosacea, skin cancer, and smoking. Odds ratios were subsequently generated and confirmed with Fisher's exact tests.

RESULTS

A total of 41,283 patients with melasma (93% female, mean [SD] age 48.8 [12.6] years) were identified (Table 1). The most frequently associated risk factors included hypertension (25%) and hormonal contraception (24%). Rosacea (OR=5.1), atopic dermatitis (OR=3.3), lupus (OR=2.5), history of skin cancer (OR=2.5), and history of internal malignancy (OR=2.1) possessed the highest odds ratios for development of melasma (all $P<0.01$) (Table 2). A statistically significant association was identified for melasma in Asian or Other/Unknown races (OR=2.0 and OR=1.7, $P<0.01$), as well as Hispanic ethnicity (OR=1.3, $P<0.01$). White, Black/African American, and Not Hispanic groups all revealed slightly lower odds (all 0.8, $P<0.01$) (Table 2).

DISCUSSION

This latest update on the association of skin of color and comorbidities of melasma further supports the findings from a prior epidemiologic study reporting preference in melanized phenotypes (Fitzpatrick skin type III-V), but less so in extreme skin types (I, II, VI).[2] The melasma cohort revealed very high associations with rosacea and atopic dermatitis, possibly related to increased blood flow and overactive mast cells present in both conditions, emphasizing the importance of treating concurrent inflammatory environments.[3,4]

TABLE 1.

Melasma Demographics. Patient demographic information for the melasma cohort and control cohort after propensity score matching for age, sex, race, and ethnicity (left). The overall prevalence of risk factors in the melasma cohort and each subgroup's respective demographic information (right).

	Melasma and Control Cohorts			Prevalence of Comorbidities in Melasma Cohort					
	All Melasma (n=41,283)	Control Cohort (n=41,283)	*P*-value	Allergic Rhinitis (n=6344)	Anti-convul-sants (n=9293)	Atopic Dermatitis (n=1909)	Diabetes (n=4697)	Hormonal Contraception (n=10216)	Hypertension (n=10683)
Age, mean [SD] years	49 (13)	49 (13)	1	57 (14)	53 (13)	51 (14)	59 (13)	42 (8)	58 (13)
Sex, no (%)									
Female	38524 (93)	38527 (93)	1	6027 (95)	8735 (94)	1794 (94)	4274 (91)	10216 (100)	9722 (91)
Male	2738 (7)	2738 (7)	1	317 (5)	558 (6)	115 (6)	423 (9)	0 (0)	961 (9)
Race, no (%)									
White	21338 (52)	21893 (52)	1	3363 (53)	4833 (52)	840 (44)	1597 (34)	6845 (67)	4273 (40)
Black/AA	4983 (12)	5053 (12)	1	1142 (18)	1766 (19)	363 (19)	1409 (30)	715 (7)	2884 (27)
Asian	2560 (6)	2562 (6)	1	444 (7)	465 (5)	191 (10)	376 (8)	511 (5)	748 (7)
Other/Unknown	12040 (30)	12038 (30)	1	1332 (21)	2137 (23)	496 (26)	1221 (26)	2043 (20)	2671 (25)
Ethnicity, no (%)									
Not Hispanic	23218 (56)	23218 (56)	1	3806 (60)	5762 (62)	1336 (70)	2630 (56)	6845 (67)	6303 (59)
Hispanic	6514 (16)	6514 (16)	1	1269 (20)	1487 (16)	267 (14)	987 (21)	1839 (18)	1933 (18)
Unknown	12040 (28)	12040 (28)	1	1269 (20)	2044 (22)	306 (16)	1081 (23)	1532 (15)	2457 (23)

	Melasma and Control Cohorts			Prevalence of Comorbidities in Melasma Cohort					
	All Melasma (n=41,283)	Control Cohort (n=41,283)	*P*-value	Hypo-thyroid (n=5740)	Lupus (n=345)	Malignancy (n=2681)	Rosacea (n=3576)	Skin Cancer (n=1078)	Smoking (n=3078)
Age, mean [SD] years	49 (13)	49 (13)	1	53 (13)	52 (12)	58 (14)	49 (12)	57 (14)	52 (12)
Sex, no (%)									
Female	38524 (93)	38527 (93)	1	5568 (97)	335 (97)	2520 (94)	3469 (97)	970 (90)	2740 (89)
Male	2738 (7)	2738 (7)	1	172 (3)	10 (3)	161 (6)	107 (3)	108 (10)	338 (11)
Race, no (%)									
White	21338 (52)	21893 (52)	1	3157 (55)	148 (43)	1582 (59)	2360 (66)	776 (72)	1693 (55)
Black/AA	4983 (12)	5053 (12)	1	631 (11)	79 (23)	429 (16)	215 (6)	43 (4)	677 (22)
Asian	2560 (6)	2562 (6)	1	459 (8)	17 (5)	134 (5)	143 (4)	22 (2)	92 (3)
Other/Unknown	12040 (30)	12038 (30)	1	1435 (25)	93 (27)	536 (20)	823 (23)	216 (20)	586 (19)
Ethnicity, no (%)									
Not Hispanic	23218 (56)	23218 (56)	1	3559 (62)	214 (62)	1877 (70)	2289 (64)	765 (71)	2031 (66)
Hispanic	6514 (16)	6514 (16)	1	918 (16)	72 (21)	375 (14)	536 (15)	76 (7)	462 (15)
Unknown	12040 (28)	12040 (28)	1	1263 (22)	59 (17)	429 (16)	751 (21)	237 (22)	585 (19)

AA=African American. ICD-10 codes used: Melasma=L81.1, Allergic rhinitis=J30.9, Anticonvulsants=CN400, Atopic Dermatitis=L20, Diabetes=E08-E13, Hormonal contraceptives=HS200, Hypertension=I10-I16, Hypothyroid=E03, Lupus=L93, Malignancy=Z85, Rosacea=L71, Skin Cancer=C43-C44, Smoking=F17.

Cutaneous malignancies were more frequently seen in melasma patients (778 (72%) nonmelanoma, 300 (28%) melanoma cases), leading us to speculate several plausible explanations, from higher sun exposure, hormonal stimuli, altered oxidative status, and impaired skin barriers, which promote melasma and may also predispose the development of skin cancer.[3] Similarly, a history of internal malignancy (most commonly lymphoproliferative (1268, 47%) and breast (208, 8%)) possessed a high odds ratio (2.1). This association remains more difficult to explain, possibly related to higher inflammatory states or hormonal milieu changes, whether disease-specific or iatrogenic.[1] These findings lead us to suggest that melasma patients may benefit from increased skin cancer surveillance and age-appropriate cancer screening.

TABLE 2.

Melasma Risk Factor Analysis			
Risk Factor, no (%)	**Melasma (n = 41,283)**	**Control (n = 41,283)**	**OR***
Race			
White	21337 (52)	26744 (65)	0.8
Black/AA	4983 (12)	5895 (14)	0.8
Asian	2559 (6)	1283 (3)	2.0
Other/Unknown	12040 (29)	7163 (17)	1.7
Ethnicity			
Not Hispanic	23216 (56)	28612 (69)	0.8
Hispanic	6514 (16)	5157 (12)	1.3
Comorbidities			
Rosacea	1704 (3.9)	332 (0.8)	5.1
Atopic Dermatitis	960 (2.3)	309 (0.7)	3.3
Skin Cancer	629 (1.5)	263 (0.6)	2.5
Lupus	222 (0.5)	89 (0.2)	2.5
Malignancy	1589 (3.8)	777 (1.8)	2.1
Hormonal Contraception	7923 (19)	3752 (9)	2.1
Allergic Rhinitis	4742 (11.5)	2581 (6.2)	1.9
Hypothyroid	4088 (9.9)	2276 (5.5)	1.8
Anticonvulsants	5907 (14.3)	3886 (9.4)	1.5
Hypertension	7731 (18.7)	5771 (13.9)	1.3
Diabetes	3230 (7.8)	2858 (6.9)	1.1
Smoking	2332 (5.6)	2533 (6.1)	0.9

Incidence of risk factors in melasma cohort compared to control cohort. Age, sex, and comorbidities held constant for race and ethnicity analysis. Age, sex, race, and ethnicity held constant for comorbidity analysis. AA=African American. OR=odds ratio. *=all *P*-values <0.05.

CONCLUSION

Understanding the potential associations between these risk factors and melasma will better improve the management and monitoring of the most susceptible patients. Limitations of this study include the retrospective nature of data collection, the potential for misclassification of diagnoses using ICD-10 codes, and the correlative, not causative, nature of our analysis.

DISCLOSURES

The authors have no conflicts of interest to disclose.

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