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THE IMPACT OF SMOKING AND ALCOHOL CONSUMPTION ON SKIN HYDRATION, SENSITIVITY, AND AGING: A CROSS-SECTIONAL STUDY

Dermatology

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ABSTRACT

Background: Skin health is shaped by multiple environmental and lifestyle factors, with smoking and alcohol consumption recognized as key contributors. **Objective:** To evaluate the association between skin health and the use of alcohol and tobacco. **Methodology:** A cross-sectional survey was conducted among 227 participants attending the Dermatology Outpatient Department. A validated, self-designed questionnaire was distributed via Google Forms to collect demographic data, lifestyle habits, and self-perceived skin health parameters. **Results:** Of the participants, 150 (66.1%) were female, and most (170; 74.8%) were aged 18–29 years. Alcohol consumption was reported by 168 participants (74%), with the highest prevalence in the 18–29 age group (79.3%). Tobacco use was most commonly in the form of cigarette smoking (50; 22%). Regarding skin health, 79 participants (31.2%) reported dry skin, 68 (30.4%) reported oily skin, and 81 (35.7%) noted pigmentation. The onset of skin aging was reported by 101 participants (44.5%), with a statistically significant association observed ($p = 0.001$). **Conclusion:** Both smoking and alcohol consumption significantly influence skin condition and facial aging, albeit through different mechanisms.

KEYWORDS

Facial Skin Ageing, Alcohol, Tobacco, Cigarette

INTRODUCTION

As Desmond Morris once remarked, "Flawless skin is the most universally desired human feature" (Morris D, 2010). Among all human organs, the skin holds a unique role in overall health-it not only acts as a robust barrier against environmental stressors but also actively participates in regulating immune responses. Due to its visibility, skin health and appearance can significantly influence self-esteem, mental well-being, social interactions, and overall quality of life (Clatici VG et al., 2017).

Aging is an inevitable biological process that manifests in the skin as folds, ridges, and wrinkles, resulting from factors such as reduced body mass, inadequate hydration, and the breakdown of the dermal-epidermal junction (Potekaev NN et al., 2023). The process of skin aging arises from the combined effects of internal (endogenous) factors-such as genetic mutations, cellular metabolism changes, and hormonal fluctuations-and external (exogenous) factors, including ultraviolet (UV) radiation, environmental pollutants, chemicals, and toxins (Chaudhary M et al, 2020).

Smoking is a well-documented contributor to premature skin aging, leading to pronounced wrinkles, reduced elasticity, and uneven pigmentation through mechanisms such as collagen degradation and impaired microvascular circulation (Yazdanparast T et al., 2019). Sørensen et al . reported that smokers exhibit notably lower collagen density and more severe wrinkling compared to non-smokers. Additionally, toxins in nicotine and tobacco increase transepidermal water loss (TEWL), causing persistent dryness and irritation. Beyond aging, smoking has been associated with heightened skin sensitivity and slower wound healing, underscoring its broader dermatological risks (Pavlou P et al., 2009).

Similarly, Liu and Chen found that alcohol consumption impairs the skin's barrier function and alters lipid composition, contributing to higher incidences of xerosis (dry skin), irritation, and inflammation. As a vasodilator, alcohol can cause persistent facial redness, visible broken capillaries, and increased vulnerability to inflammatory conditions such as rosacea. Long-term alcohol intake may also deplete key antioxidants, including vitamins A and E, which are essential for cellular repair and defense against oxidative stress-thereby accelerating skin aging (Makrantonaki E et al., 20027).

While numerous studies have explored the impact of smoking and alcohol individually, limited research has examined their combined influence on skin hydration, sensitivity, and aging. This survey aimed to assess the relationship between tobacco and alcohol use and skin health in men and women aged 18 to 50 years.

MATERIALS AND METHODS

This study was designed, analyzed, and reported in accordance with the STROBE guidelines. Ethical clearance was obtained from the Institutional Review Board of JJM Medical College, Davangere, prior to commencement. A cross-sectional survey was conducted among patients attending the Outpatient Department (OPD) of the Dermatology Department at Bapuji Hospital and Chigateri General Hospital, both affiliated with JJM Medical College, Davangere, who met the eligibility criteria.

Inclusion Criteria

1. Age between 18 and 50 years.
2. Willingness to share a WhatsApp number and provide informed consent by "opting-in" via a web link sent through email.
3. Ability to read and understand either English or Kannada.

Exclusion Criteria

1. History of significant trauma or burns that altered the facial skin's appearance.
2. Pre-existing severe dermatological conditions (e.g., psoriasis, severe atopic dermatitis, scleroderma) that could interfere with skin hydration or aging assessments.
3. Previous facial resurfacing procedures (e.g., laser treatments, surgery) or chemical/mechanical peels (e.g., microdermabrasion, glycolic peels) at any time before enrollment.

Sample Size Estimation

Sample size is calculated by using the formula,

$$\text{Sample size}(n) = Z^2 \times p(1-p) \div e^2$$

Where,
P = Prevalence or proportion of event (20%, based on the previous cases at the hospital over a period of one year) E = Precision (0.05)
Z = Normal deviate (1.96)
$\text{Sample size}(n) = (1.96)^2 \times 0.20(1-0.8) \div (0.05)^2 = 384.16$
A minimum of 256 participants were considered.

Data Collection

A self-designed, structured, close-ended, web-based questionnaire was administered via Google Forms. The questionnaire contained 18 items divided into two sections:

- **Section 1 (10 questions):** Demographic and lifestyle details, including age, gender, dietary type (vegan/eggetarian/mixed), frequency of junk food consumption (never/rarely/occasionally/weekly/daily), and patterns of alcohol and tobacco use (frequency, duration, and type).
- **Section 2 (8 questions):** Self-assessment of skin health, covering hydration, sensitivity, pigmentation, tanning/burning tendency, and onset of skin aging.

The questionnaire underwent pretesting for face and content validity, evaluated by two dermatology faculty members. The Content Validity Index (CVI) score was 0.88, indicating strong content validity. Participants were encouraged to complete the questionnaire on the same day of receipt. A reminder was sent to non-responders to improve participation. The final response rate was 88.6%. The main reasons for non-participation were lack of interest and concerns over sharing personal details.

Statistical Analysis

Data analysis was performed using SPSS version 25.0 (IBM Corp., Armonk, NY, USA). Qualitative variables were summarized as frequencies and percentages, and quantitative variables were expressed as mean ± standard deviation (SD). The Chi-square test or Fisher's exact test was used to evaluate associations between alcohol and tobacco use and skin aging. Statistical significance was set at $p < 0.05$.

RESULTS

Table 1: Baseline Demographic Details of Study Participants by Age

Characteristics	N	18-29 years	30-39 years	40-49 years	50-60 years	p-value
Sex						
Male	77 (33.9%)	59 (26%)	12 (5.3%)	3 (1.3%)	3 (1.3%)	0.001
Female	150 (66.1%)	111 (48.9%)	17 (7.5%)	6 (2.6%)	16 (7%)	
Diet						
Vegetarian	59 (26%)	34 (15%)	6 (2.6%)	7 (3.1%)	12 (5.3%)	0.001
Eggetarian	25 (11%)	20 (8.8%)	4 (1.8%)	0	1 (0.4%)	
Mixed	143 (63%)	116 (51.1%)	19 (8.4%)	2 (0.9%)	8 (2.7%)	
Frequency of junk food consumption						
Never	6 (2.6%)	1 (0.4%)	0	1 (0.4%)	4 (1.8%)	0.001
Rarely (1-2 times/month)	66 (29.1%)	45 (19.8%)	7 (3.1%)	2 (0.9%)	12 (5.3%)	
Occasionally (1-2 times/ week)	105 (46.3%)	83 (36.6%)	14 (6.6%)	5 (2.2%)	3 (1.3%)	
Frequently (3-4 times/week)	44 (19.4%)	37 (16.3%)	6 (2.6%)	1 (0.4%)	0	
Daily	6 (2.6%)	4 (1.8%)	2 (0.9%)	0	0	

Table 2: Alcohol and Tobacco Consumption Details of Study Participants by Age

Characteristics	N	18-29 years	30-39 years	40-49 years	50-60 years	p-value
Type of alcohol						
Vodka	56	45 (80.3%)	6 (10.7%)	2 (3.5%)	3 (5.3%)	0.911
Whiskey /Scotch	52	39 (75%)	10 (19.2%)	1 (1.9%)	2 (3.8%)	
Beer	50	40 (80%)	7 (14%)	3 (6%)	3 (6%)	
Rum	22	18 (81.8%)	3 (13.6%)	1 (4.5%)	0	
Gin	9	7 (77.7%)	1 (11.1%)	0	1 (11.1%)	
Wine	16	14 (87.5%)	1 (6.2%)	0	1 (6.2%)	
Tequila	7	5 (71.4%)	2 (28.6%)	0	0	
Other	6	5 (83.3%)	1 (16.7%)	0	0	
Frequency of consumption						
Never	59	28 (47.4%)	14 (23.7%)	5 (8.4%)	12 (20.3%)	0.407
Rarely	60	37 (61.6%)	11 (18.3%)	12 (20%)	0	
Once a month	51	32 (62.7%)	15 (29.4%)	1 (1.9%)	3 (5.8%)	
Every week	35	19 (54.2%)	14 (40%)	1 (2.8%)	1 (2.8%)	
Daily	22	14 (63.6%)	4 (18.1%)	1 (4.5%)	3 (13.6%)	
Quantity						
30 ml	20	14 (70%)	3 (15%)	0	3 (15%)	0.548
60 ml	40	24 (60%)	14 (35%)	0	2 (5%)	
90 ml	40	26 (65%)	13 (32.5%)	1 (2.5%)	0	
120 ml	22	20 (90.9%)	1 (4.5%)	1 (4.5%)	0	
180 ml	18	13 (72.2%)	5 (27.8%)	0	0	
>200 ml	28	25 (89.2%)	0	2 (7.1%)	1 (3.5%)	
Type of smoking						
Cigarette	50	38 (76%)	7 (14%)	3 (6%)	2 (4%)	0.977
E-cigarettes, vapes	10	10 (100%)	0	0	0	
Bidi	1	0	0	0	1 (100%)	
Hookah	7	5 (71.4%)	2 (28.6%)	0	0	
All	1	1 (100%)	0	0	0	
No smoking	158	118 (74.6%)	19 (12%)	6 (3.7%)	16 (10.1%)	
Frequency of smoking						
Have tried once or twice	26	20 (76.9%)	4 (15.3%)	1 (3.8%)	1 (3.8%)	0.548
Rarely	10	8 (80%)	0	1 (20%)	1 (20%)	
Occasionally	5	3 (60%)	1 (20%)	1 (20%)	0	
Weekly	6	6 (100%)	0	0	0	
Frequently	2	1 (50%)	0	0	1 (50%)	
Daily	15	13 (86.7%)	2 (13.3%)	0	0	
Quit <5 years ago	1	1 (100%)	0	0	0	
Quit >5 years ago	5	3 (60%)	2 (40%)	0	0	
Duration of smoking						
<1 year	23 (33.3%)	18 (78.2%)	2 (8.6%)	0	1 (4.4%)	0.001
1-5 years	32 (46.3%)	26 (81.2%)	4 (12.5%)	1 (3.1%)	1 (3.1%)	
6-10 years	12 (17.3%)	7 (58.3%)	4 (33.3%)	1 (8.3%)	0	
11-20 years	2 (2.8%)	0	0	1 (50%)	1 (50%)	

Table 3 Onset of Skin Ageing and Age

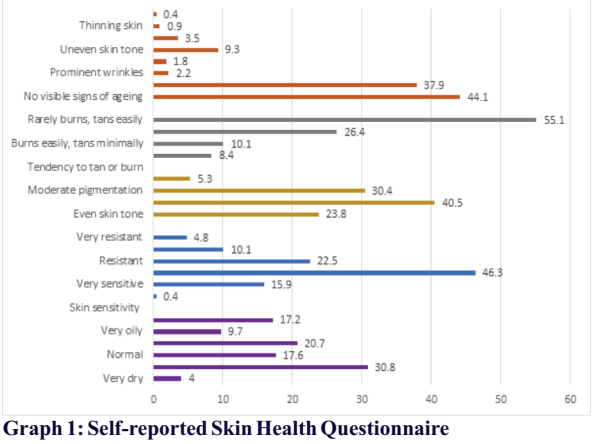
Age of onset of skin ageing	N	14-29 years	30-39 years	40-49 years	50-59 years	p-value
Below 25 years	7 (3.1%)	7 (3.1%)	0	0	0	0.001
25-30 years	101 (44.5%)	83 (36.6%)	14 (6.2%)	3 (1.3%)	1 (0.4%)	
31-40 years	7 (3.1%)	0	6 (2.6%)	1 (0.4%)	0	
41-50 years	10 (4.4%)	1 (0.4%)	3 (1.3%)	3 (1.3%)	3 (1.3%)	
Above 50 years	12 (5.3%)	0	0	0	12 (5.3%)	
No signs of ageing yet	90 (39.6%)	79 (34.8%)	6 (2.6%)	2 (0.9%)	3 (1.3%)	

Table 4: Alcohol Consumption and Skin Health

Skin health	N	Rare (N=60)	Occasion (N=51)	Frequent (N=57)	p-value
Skin hydration					
Very dry	44	11 (18.3%)	7 (13.7%)	26 (45.6%)	0.001
Somewhat dry	38	15 (25%)	11 (21.5%)	12 (21%)	
Normal	25	8 (13.3%)	12 (23.5%)	0	
Somewhat oily	27	8 (13.3%)	11 (21.5%)	8 (15.6%)	
Very oily	12	4 (6.7%)	3 (5.8%)	5 (8.7%)	
Combination	27	14 (23.3%)	7 (13.7%)	6 (10.5%)	
Skin sensitivity					
Normal	13	10 (16.7%)	1 (1.9%)	2 (3.5%)	0.001
Very sensitive	21	8 (13.3%)	8 (15.6%)	5 (8.7%)	
Somewhat sensitive	52	20 (33.3%)	18 (35.3%)	14 (24.5%)	
Resistant	30	11 (18.3%)	2 (3.9%)	17 (29.8%)	
Somewhat resistant	29	8 (13.3%)	12 (23.5%)	9 (15.7%)	
Very resistant	23	3 (5%)	10 (19.6%)	10 (17.5%)	

Table 5: Tobacco Consumption and Skin Health

Skin health	N	0 pack years (N=164)	1-10 pack years (N=64)	11-20 pack years (N=3)	p-value
Skin hydration					
Very dry	10	3 (30%)	6 (60%)	1 (10%)	0.245
Somewhat dry	70	50 (71.4%)	20 (28.6%)	0	
Normal	40	29 (72.5%)	10 (25%)	1 (2.5%)	
Somewhat oily	47	37 (78.7%)	9 (19.1%)	1 (2.1%)	
Very oily	21	13 (61.9%)	8 (38.1%)	0	
Combination	39	28(71.8%)	11 (28.2%)	0	
Skin sensitivity					
Normal	13	10 (76.9%)	1 (7.7%)	2 (15.4%)	0.883
Very sensitive	21	8 (38%)	8 (38%)	5 (23.8%)	
Somewhat sensitive	52	20 (38.5%)	18 (34.6%)	14 (26.9%)	
Resistant	30	11 (36.7%)	2 (6.7%)	17 (56.7%)	
Somewhat resistant	29	8 (27.6%)	12 (41.4%)	9 (31%)	
Very resistant	23	3 (13%)	10 (43.5%)	10 (43.5%)	



Graph 1: Self-reported Skin Health Questionnaire

Among the 227 participants, the majority were female (150; 66.1%). Most participants (170; 74.8%) were aged 18–29 years. A mixed diet was reported by 143 participants (63%), and junk food consumption 1–2 times per week was the most common pattern (105; 46.3%) (Table 1).

Alcohol consumption was reported by 168 participants (74%), with the highest prevalence in the 18–29 age group (79.3%). The most frequently consumed alcoholic beverage was vodka (25.3%), followed by whiskey/scotch (23.5%), beer (24%), rum (10%), gin (4.1%), wine (7.2%), tequila (3.2%), and other alcoholic drinks (2.7%). Regarding frequency, 35.7% consumed alcohol rarely, 30.3% once a month, 20.8% weekly, and 13% daily. The majority (47.6%) reported a consumption quantity of 60–90 ml.

Tobacco use was most often in the form of cigarette smoking (50; 22%), followed by e-cigarettes (10; 4.5%). The predominant age group for tobacco use was 18–29 years (80%). Duration of smoking was reported as 1–5 years by 46.3% of tobacco users, and less than one year by 33.3% (Table 2).

In terms of self-perceived skin health, 79 participants (31.2%) reported dry skin, while 68 (30.4%) reported oily skin. Most respondents described their skin as sensitive (141; 62.2%), whereas only 11 (4.8%) reported very resistant skin. Skin pigmentation was noted by 81 participants (35.7%), and 125 (55.1%) reported a tendency to tan. Fine lines were observed by 86 participants (37.9%), and the onset of skin aging was reported by 101 participants (44.5%) (p = 0.001) (Graph 1, Table 3).

A statistically significant association was found between frequent alcohol consumption and dry skin (p = 0.001). Similarly, skin sensitivity was significantly associated with alcohol consumption (p = 0.001) (Table 4). Among smokers, 27 (40%) reported dry skin, while 29 (43%) reported oily skin (Table 5).

DISCUSSION

In this study, alcohol consumption was significantly associated with both reduced skin hydration and increased skin sensitivity, with a clear dose-dependent relationship observed. Tobacco use also demonstrated an influence on skin health.

Previous research has linked alcohol consumption to increased facial wrinkles and midface volume loss, contributing to an older perceived age, particularly in heavy drinkers (Martires et al., 2009, Hamer et al., 2017, Goodman et al., 2019, Yanine et al., 2022). The quantity of alcohol consumed appears to be a critical factor in determining its impact on skin aging. However, findings in the literature are inconsistent—while some studies report a strong correlation between alcohol intake and accelerated facial aging, others, such as a twin study (Rexibye et al., 2006), found no significant association, and a cohort-based survey ((Martires et al., 2009) even suggested a reduced risk of skin aging with alcohol consumption. These discrepancies may reflect differing effects of light-to-moderate versus heavy drinking, as well as the potential protective influence of polyphenols found in wine and certain spirits. In our study, most alcohol consumers reported a combination of vodka, gin, tequila, and wine, which may have increased overall alcohol intake and contributed to the higher prevalence of skin dryness and sensitivity.

Several mechanisms have been proposed to explain alcohol's effects on skin health. Alcohol increases microvascular permeability, which can directly cause facial flushing and promote tissue inflammation (Sawada et al., 2021). During metabolism, alcohol produces acetaldehyde and generates reactive oxygen species (ROS), leading to oxidative stress and epigenetic alterations that may impair DNA function, weaken immune defenses, and potentially contribute to carcinogenesis (Jung et al., 2011). Excessive alcohol consumption also affects systemic health, including vitamin depletion, tissue damage, dysregulated inflammatory responses, and reduced production of type I collagen by skin fibroblasts (Morita et al., 2009). Alcohol-related reduction in fat mass has been suggested as a cause of midface volume loss, while under-eye puffiness may result from exposure of the suborbital fat pad as midface tissue recedes Guillaumet-Adkins et al., 2017). Furthermore, alcohol weakens the skin's antioxidant defense system, increasing vulnerability to sunburn and ultraviolet (UV)-induced aging (Morita et al., 2009).

Cigarette smoking is similarly associated with photodamage, likely due to downregulation of the aryl hydrocarbon receptor, which mediates responses to UVB-induced photoproducts (Yazdanparast et al., 2019). In our study, smoking history (measured in pack-years) correlated with both skin dryness and sensitivity, consistent with previous findings. Yin et al. identified smoking as an independent risk factor for wrinkle development, and a twin studyby Okada et al., suggested that free radicals and ROS generated by smoking accelerate aging changes in both the epidermis and dermis. Other studies have reported altered biophysical skin properties in smokers, including higher hemoglobin levels compared to non-smokers and nicotine-induced melanocyte stimulation. The thickness of the stratum corneum has been shown to correlate negatively with years of smoking, while

cheek skin thickness increases in smokers, though not at other facial sites. Smoking has also been linked to the deepening of nasolabial folds and other coarse facial wrinkles (Glaser DA et al, 2016, Unsal et al., 2001).

This study has several limitations. The findings may not be generalizable beyond the study population, as the sample was limited to a single center in India with a relatively small sample size. A more diverse and geographically varied population would help validate these results. Additionally, self-reported alcohol and tobacco use may be subject to recall bias, and relying solely on questionnaires could reduce data accuracy. Future studies should incorporate objective clinical examinations of facial skin to complement self-reported assessments.

CONCLUSION

A significant association was observed between alcohol consumption and facial skin health, with a dose-dependent relationship identified for skin dryness and sensitivity. These results offer dermatologists evidence-based insights to support patient counseling on lifestyle modification.

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