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Original Article

Prevalence of Biotin Overconsumption for Beauty Purposes Influenced by Social Media: A Cross-Sectional Study

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ABSTRACT

Biotin is also commonly consumed in large quantities for cosmetic purposes, although the recommended daily value is just 30 micrograms. Laboratory immunoassays can be interfered with by these high-dose biotin supplements, which may lead to erroneous diagnosis. Social media has been an important place for health information, especially for women under 30. **Objectives:** To assess the level of biotin excess for beauty in young adult females in Pakistan. And to study its relationship with exposure to social media marketing of nutraceuticals. **Methods:** The study was conducted in Pakistan with 187 healthy female adults (18-30 years) using a community-based, cross-sectional analytical study in January-March 2026. Data were collected using an online questionnaire sent through social media. **Results:** Most participants received recommendations from social media influencers (59.9%) rather than doctors (16.0%). Two-thirds (66.8%) did not consult a healthcare professional before using biotin. The main reasons for use were hair growth (35.8%), glowing skin (23.0%), and beauty enhancement (19.3%). The prevalence of biotin overconsumption (>1000 mcg/day) was 46.0% (86/187). Social media influence was not significantly associated with biotin overconsumption ($\chi^2 = 1.82$, $p = 0.177$; AOR = 1.50, 95% CI: 0.83–2.71, $p = 0.180$). **Conclusions:** Biotin is an important supplement that plays an important role in the health of young females in Pakistan, and social media has a significant impact on this. The low rate of professional consultation points to a need for better digital health literacy and public health education to encourage safe supplement practices.

INTRODUCTION

The use of different vitamins and minerals for beauty purposes is increasing day by day globally. Such products are referred to as "nutricosmetics" [1]. Out of all other vitamins which are being sold over the counter, Vitamin B7, also named Biotin, has become the most favorite beauty supplement [2]. It is a water-soluble B-complex vitamin which is an important coenzyme for carboxylases and is also important for several other body processes such as synthesis of fatty acids, gluconeogenesis, and amino acid catabolism [3, 4]. But in the general public, it is not known for its metabolic functions. The main reason for its popularity is its efficient results in dealing with brittle nails, thin hair, and dull skin. Although the Recommended Dietary Allowance (RDA) for biotin in adults is just 30 mcg, most of the common beauty supplements contain around 5,000 to 10,000 micrograms of biotin [5, 6]. Since biotin is a water-soluble vitamin, the chances of acute toxicity are very rare. But the sudden increases in its unsupervised supplementation are a very significant clinical safety concern [7]. A very important risk associated with high doses of biotin is that it interferes with streptavidin-biotin-based immunoassays, which are used in many blood tests [8]. Because of this problem, blood tests can show incorrect numbers [9]. Troponin might show lower than it really is, so a heart problem could be missed. Thyroid tests (TSH and T4) might show as too high or too low, so the

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doctor might think there is a thyroid issue when there isn't, or miss one. Vitamin D and steroid hormone tests can also be wrong [10]. These errors in test results have led the U.S. FDA to issue several safety warnings. They have advised doctors and other healthcare workers about the serious risks of misreading lab results in patients who are taking biotin [11]. Biotin is obtained through dietary sources such as eggs, nuts, and fish. Biotin deficiency is very rare unless there are any genetic disorders or a person is consuming raw egg whites for a long time (due to avidin binding). The human body recycles biotin through the biotinidase enzyme very efficiently. So, high-dose vitamin B7 supplements are very unnecessary. An important review by Zhang *et al.* demonstrated that if biotin concentrations > 10 ng/mL are present in the serum, it makes the results of blood tests unreliable [12]. Studies have shown that high-dose biotin (commonly > 5 mg/day) can cause falsely negative troponin I and T results, leading to delayed or missed diagnoses of myocardial infarction. According to Katzman *et al*. a patient with acute chest pain was mistakenly discharged from the hospital because excessive biotin in the blood was interfering with blood test results showing that the troponin level is normal [13]. Due to which, the patient got heart attack again. A researcher reported in his study that biotin supplementation can also alter thyroid function test results by increasing them up to half of the existing values, which in turn increases the chances of misdiagnosis of Graves' disease [14]. Another study by Nguyen *et al.* reported similar results [15]. Although excessive use of vitamins has been widely studied in older adults, the growing trend of healthy young adults consuming beauty-related supplements such as biotin is not well-researched. Another survey in the United States reported that nearly 12% of adults are taking biotin supplements. Out of these, only 6% were aware that biotin could interfere with laboratory test results, which highlighted that there is a significant gap in public awareness about the potential health risks of biotin [16]. Furthermore, a previous study reported in his study that many dermatology patients were using biotin supplements at doses up to 500 times higher than the recommended dietary allowance (RDA), without consulting a doctor [17]. This was due to direct advertisement of biotin on different media platforms. In Pakistan, overconsumption of other vitamins such as Vitamin D and B12 without prescription is also studied, claiming that the influence of social media is one of its common reasons [18, 19]. Notably, none of these posts mentioned the potential adverse effects of biotin or its interference with laboratory test results. This also highlighted the lack of balanced health information on social media.

Despite the clinical evidence that high-dose biotin interferes with diagnostic laboratory tests, there is no population-based study that has quantified the prevalence of its overconsumption among the general adult population or observed its direct link to social media influence. So, it is very important to investigate whether social media exposure affects the overconsumption behaviors of biotin, which can cause risks to diagnostic accuracy and patient safety. This study aims to determine the prevalence of biotin overconsumption and evaluate its association with social media influence among the adult female population.

METHODS

It is a community-based, cross-sectional analytical study that was conducted over a period of three months, from January 2026 to March 2026. This study was conducted at the University of Lahore, Lahore, Pakistan. Data were collected after obtaining written informed consent from all participants, in accordance with the ethical principles outlined in the Declaration of Helsinki. The target population comprised apparently healthy females aged 18 to 30 years residing in Pakistan who had ever consumed biotin. Pregnant and lactating women, or those individuals who had a known genetic condition, i.e., biotinidase deficiency, individuals on prescribed biotin therapy for mitochondrial disorders, or healthcare professionals such as doctors, pharmacists, and nurses who might possess biased knowledge regarding biotin's laboratory interferences were excluded from the study. The sample size was calculated using Cochran's formula for a cross-sectional study, assuming a 12% prevalence of biotin overconsumption from previous studies, a 95% confidence interval, and a 5% margin of error, which yielded a minimum sample of 163 participants. To account for potential incomplete responses, this was inflated by 15% to a final sample size of 187 participants.[20]. The study took a non-probability sampling approach with a convenience sampling technique of snowball and purposive sampling since the study was strictly based on voluntary participation via digital dissemination. The data collection tool employed was a pre-structured questionnaire developed in Google Forms and a self-administered online questionnaire. The study was inspired by previous research, where it was observed that excess consumption of another vitamin caused the problem [19]. A multi-platform digital snowball sampling strategy was used to circulate its link. Biotin overconsumption was the dependent variable and was operationally defined as taking more than 1000 micrograms per day, and social media exposure was the independent variable and was categorized based on the self-reported fact that they were influenced to use these supplements through social media. The >1000 mcg/day threshold was selected because it is more than 30 times the RDA (30 mcg/day) and represents the lowest dose commonly marketed for hair and nail benefits. This cutoff distinguishes over-the-counter

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beauty supplementation from dietary adequacy. After data collection, the data were checked for completeness and consistency and then exported from Google Forms to MS in a single step. Questionnaires with incomplete responses or duplicate/invalid responses were not considered. Only complete and qualified responses were used in the final analysis. All participation was voluntary, and informed consent was also obtained electronically by placing a mandatory checkbox at the beginning of the form, stating that participation was voluntary and that the participant had the option of withdrawing at any time without giving any reason for his or her decision.

Data were analyzed using SPSS (version 26.0). Descriptive statistics, including frequencies and percentages, were computed for categorical variables. Biotin overconsumption was defined as a daily intake >1000 mcg. The association between social media influence and overconsumption was assessed using the chi-square test. Multivariate logistic regression was performed with overconsumption as the dependent variable, adjusting for age, education, and occupation, with $p < 0.05$ considered statistically significant.

RESULTS

A total of 187 participants were included in the final analysis. The findings are organized as follows: the demographic characteristics of the study population are described, the role of social media in influencing biotin use is examined, the perceptions and reasons of participants for biotin consumption are presented, and finally, the association between the source of recommendation and biotin use is analyzed using a chi-square test. The study presents the demographic characteristics of the study participants. The majority of participants were aged 24–27 years, were undergraduate students, and were currently enrolled as students (Table 1).

Table 1: Demographic Profile

Variables	Category	n (%)
Age	18–20	47 (25.1%)
	21–23	47 (25.1%)
	24–27	70 (37.4%)
	28–30	23 (12.3%)
Education	Undergraduate	104 (55.6%)
	Graduate	42 (22.5%)
	Post Graduate	41 (21.9%)
Occupation	Student	104 (55.6%)
	Unemployed	83 (44.4%)

The demographic profile indicates that the study participants were predominantly young females with a relatively high educational background. As most respondents were students, the sample largely represents young females who are more likely to be exposed to digital platforms and emerging health and beauty trends. The results summarize the influence of social media on biotin supplement use and consultation practices. Most participants reported receiving recommendations from social media influencers, while relatively few consulted healthcare professionals before using biotin supplements (Table 2).

Table 2: Social Media Influence

Variables	Category	n (%)
Recommendation Source	Social Media Influencer	112 (59.9%)
	Doctor	30 (16.0%)
	Family/Friends/Others	45 (24.1%)
	Total	187 (100%)
Doctor Consultation	Yes	62 (33.2%)
	No	125 (66.8%)
	Total	187 (100%)

The findings suggest that social media plays a substantial role in influencing biotin supplement use. Moreover, the low rate of medical consultation before initiating supplementation indicates that many participants rely on non-professional sources when making decisions about biotin use. This study shows the participants' primary reasons for using biotin supplements. Hair growth was the most frequently reported reason, followed by glowing skin and beauty enhancement (Table 3).

Table 3: Perception and Reasons for Biotin Use

Variables	Category	n (%)
Reason for Use	Hair Growth	67 (35.8%)
	Glowing Skin	43 (23.0%)
	Stronger Nails	21 (11.2%)
	Beauty Enhancement	36 (19.3%)
	Doctor's advice	13 (7.0%)
	Other	7 (3.7%)

The chi-square test showed no statistically significant association between social media influence and biotin overconsumption ($\chi^2 = 1.82$, df = 1, $p = 0.177$). Although overconsumption was more common among those influenced by social media (50.0%) compared to those not influenced (40.0%), this difference was not statistically significant. These findings suggest that, within this sample, social media influence was not a significant factor associated with biotin overconsumption (Table 4).

Table 4: Association Between Recommendation Source and Biotin Consumption

Social Media Influence	Overconsumption (>1000 mcg/day), n (%)	No Overconsumption (≤1000 mcg/day), n (%)	Total
Yes	56 (50.0%)	56 (50.0%)	112
No	30 (40.0%)	45 (60.0%)	75
Total	86 (46.0%)	101 (54.0%)	187
Chi-square (χ^2)	1.82	–	–

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Degrees of freedom (df)	1	–	–
p-value	0.177	–	–

In the multivariate logistic regression, social media influence was not a significant predictor of biotin overconsumption after adjusting for age, education, and occupation (AOR = 1.50, 95% CI: 0.83–2.71, p = 0.180). None of the demographic variables showed statistically significant associations. The Hosmer-Lemeshow test indicated good model fit (χ^2 = 5.12, df = 8, p = 0.745), supporting the validity of the estimates.

Table 5: Multivariate Logistic Regression Analysis of Factors Associated with Biotin Supplement Use (n=210)

Variables	Category	Adjusted Odds Ratio (AOR)	95% CI	p-value
Social Media Influence	No	1.00	–	–
	Yes	1.50	0.83–2.71	0.180
Age	18–20	1.00	–	–
	21–23	1.20	0.60–2.40	0.600
	24–27	1.10	0.55–2.20	0.780
	28–30	0.90	0.40–2.00	0.800
Education	Undergraduate	1.00	–	–
	Graduate	1.30	0.70–2.40	0.400
	Post Graduate	0.80	0.40–1.60	0.530
Occupation	Student	1.00	–	–
	Unemployed	0.95	0.55–1.65	0.850
Model Fit	Hosmer-Lemeshow Test	χ^2 = 5.12	df = 8	0.745

DISCUSSION

This study explored the influence of social media on biotin supplement use among young female adults in Pakistan and examined the reasons underlying its consumption. The findings indicate that biotin is mainly used for cosmetic purposes, and social media is emerging as the most influential source of its recommendation [19]. These findings reflect how these digital platforms impact health-related decisions, particularly among young adults who are frequently exposed to beauty-related content online [1]. The demographic profile of the participants showed that the study population mainly consisted of young, educated females, the majority of whom were undergraduate students. Previous studies have demonstrated that young adults are more likely to follow beauty influencers, which makes them more likely to adopt dietary supplements that are promoted online [16, 18]. This is also evident from our study. One of the most notable findings of this study was that social media influencers were the main source of recommendation of biotin supplementation, whereas only a few participants reported that they initiated biotin supplements on a doctor's advice. Approximately two-thirds of participants did not consult a healthcare professional before using biotin. These findings are consistent with previous research demonstrating that health information obtained through social media increasingly influences self-medication and supplement consumption [20]. Another study reported that repeated exposure to influencer-generated beauty content contributes to reduced health literacy as it encourages people to trust personal stories and influencer experiences rather than seeking evidence-based medical advice [20]. Similarly, in a study, the author observed that many dermatology patients self-prescribed high-dose biotin after being influenced by advertisements. So, these findings suggest that social media has become a major factor in unsupervised dietary supplement use. The current study also found that cosmetic benefits, particularly hair growth, glowing skin, and beauty enhancement, were the main reasons why they were consuming biotin. This observation supports previous evidence that indicates that, from being an essential micronutrient, biotin has now become a commercially marketed beauty supplement [3]. According to another study, biotin is very commonly consumed by healthy adults, although its deficiency is very rare [4]. Another study also concluded that there is very limited clinical evidence that supports that taking biotin supplements in routine improves hair or nail health in individuals without deficiency [7]. The increasing popularity of biotin supplements is an important public health concern. Although biotin is generally considered safe because of its water-soluble nature, its excessive intake is still risky. Despite the widespread influence of social media, the association between social media influence and biotin consumption was not statistically significant. This finding suggests that although social media was the most commonly reported source of recommendation by the current study participants, biotin use can also be influenced by several other factors such as recommendations by friends and family members, and the increasing commercial availability of beauty supplements. It is also possible that, as all participants are female biotin users, due to this homogeneity of participants, the results are not significant. Future studies involving both users and non-users may provide a better assessment of factors associated with biotin consumption.

The limitations of this study can be its cross-sectional design and convenience sampling. Its self-reported data may also limit the generalizability and causal interpretation of the findings. Future research should include larger and more representative populations. The actualdosage of biotin and awareness of its potential risks, and employ longitudinal designs to better understand the long-term impact of social media on supplement consumption behaviors.

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CONCLUSIONS

Among young women in Pakistan, social media influencers were the most common source of recommendation for biotin use (59.9%), while only 16.0% received doctor recommendations and 66.8% did not consult a healthcare professional. The primary reasons for use were hair growth (35.8%), glowing skin (23.0%), and beauty enhancement (19.3%). The prevalence of biotin overconsumption (>1000 mcg/day) was 46.0% (86/187), but social media influence was not significantly associated with overconsumption (χ^2=1.82, p=0.177; AOR=1.50, p=0.180).

Authors' Contribution

Conceptualization: SK
Methodology: SK
Formal analysis: SK
Writing and Drafting: SK, AM, MA
Review and Editing: SK, AM, MA

All authors approved the final manuscript and take responsibility for the integrity of the work

Conflicts of Interest

All the authors declare no conflict of interest.

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