Abstract

Background: Adolescents are psychologically more unstable and are at risk for acne and problematic Internet usage (PIU). Objectives: We aimed to evaluate PIU and characteristics of Internet usage in adolescents with acne and compared it with a control group. In addition, the relationship between psychiatric variables and problematic Internet use was examined. Methods: The study included 93 adolescents with acne and 93 healthy adolescents who were matched for age, sex, and educational level. Information forms on Internet usage characteristics, PIU Scale-Adolescent, Satisfaction with Life Scale, University of California, Los Angeles-Loneliness Scale short form, and Social Anxiety Scale for Adolescents were applied to the case and control groups. In addition, a global acne grading system and Acne Quality of Life Scale were applied to the case group. Results: PIU, duration of daily Internet usage, and membership of social sharing sites were higher in adolescents with acne than the control group. Decreased quality of life, decreased satisfaction with life levels, and increased social anxiety/loneliness levels were observed in adolescents with acne. In addition, it was determined that life satisfaction of adolescents with acne decreased at par with their quality of life; moreover, increases in the level of loneliness/social anxiety were accompanied by increases in PIU. Conclusion: The negative impact of acne on the quality of life, satisfaction with life, loneliness, and social anxiety may lead to the transition of adolescents with acne to PIU.

Keywords: Acne, adolescent, problematic Internet usage

Evaluation of problematic Internet usage, characteristics of Internet usage, and other related psychiatric factors in adolescents with acne

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INTRODUCTION

The relationship between the presence of acne and mental status has been investigated for a long time and it is reported that regardless of its severity, acne can cause psychiatric problems. The negative impact of lesions in the visible areas of the body on social anxiety has been reported in adolescents. Social anxiety can lead to a weakening of social relationships and cause the individual to become more prone to mental disorders. Adolescents with acne reportedly found it difficult to engage in social interactions such as establishing relationships with friends, meeting new people, getting into the society, and interacting with the opposite sex.

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Problematic Internet usage (PIU) is defined as compulsive Internet usage leading to deterioration of important dimensions of life such as family and work, accompanied by a constant failure to control Internet usage.\cite{4} The risk of a shift from Internet usage to PIU for adolescents is very high. Adolescence is the period of psychosocial development during which an individual’s character develops and they are most vulnerable to environmental influences.\cite{15} It is reported that there is a significant relationship between PIU and social anxiety/loneliness levels in adolescents and that social anxiety can be an important factor leading to PIU. Adolescents with low levels of social skills and social relationships are at risk for PIU.\cite{6} PIU also negatively affects satisfaction with life levels; at the same time, low satisfaction with life levels lead to PIU.\cite{7}

Based on the fact that acne and PIU both have an effect on satisfaction with life, quality of life, loneliness, and social anxiety levels\cite{1,5,2} and are both common in adolescence,\cite{1,15} we aimed in this study to evaluate PIU and Internet usage characteristics in adolescents with acne and compare it with a control group. We also investigated the relationship between PIU and psychiatric variables (quality of life, satisfaction with life, social anxiety, and loneliness) in adolescents with acne.

**Materials and Methods**

The study was initiated with the decision of Süleyman Demirel University (SDU) Faculty of Medicine Clinical Research Ethics Committee (No: 28, Date 21.01.2015). Ninety-three adolescents with acne who applied within a period of 1 year to the Dermatology Department of SDU Medical Faculty Research and Practice Hospital were enrolled in the study. The inclusion criteria to the study were as follows: the absence of cognitive dysfunction to the extent that the scales could not be filled, amelioration of acne due to the use of cosmetics and medicines, absence of any additional disease that may cause acne, absence of any chronic illness other than acne, lack of history of systemic isotretinoin treatment and having a level of education of at least high school or above. The control group consisted of 93 healthy adolescents matched with the patient group for age, gender, and educational level. The control cohort was recruited from the relatives of patients who applied to the same hospital. Participants were informed about the study. Adolescents who agreed to participate in the study provided signed informed consent forms.

Adolescents with acne were administered the Global Acne Grading System (GAGS) to assess acne severity and the Acne Quality of Life Scale (AQLS) to assess the quality of life. In addition, all adolescents (both in the case and control groups) were asked to fill up the following forms: information form for Internet usage features, Satisfaction with Life Scale (SWLS), UCLA loneliness scale-short form, Social Anxiety Scale for Adolescents (SAS-A), and Problematic Internet Use Scale for Adolescents (PIUS-A).

Information form for Internet usage features is a form that determines the sociodemographic and Internet usage characteristics of the participants. This form included data on age, sex, and Internet usage features of the participants as well as access to different technologies (Internet, cell phone/smartphone/presence of a home computer, Internet access from mobile phone, daily Internet usage time, and social sharing site membership).

GAGS is a measurement system developed by Doshi et al.,\cite{7} which scores acne severity according to the distribution of acne and the type of lesion.\cite{9} The GAGS score can range between 0 and 44.

AQLS, developed by Gupta et al.,\cite{5} aims to determine the relationship between the severity of acne and associated psychological morbidities.\cite{9} Reliability study of the Turkish version of the scale was performed by Demirçay et al.\cite{10} This form can be used for acne patients aged 14 years and older.\cite{10} A high total score indicates a low quality of life.

SWLS was developed to measure the satisfaction with life level of individuals.\cite{11} The Turkish validity/reliability study of the scale was conducted by Koker and can be applied to patients at the age of 14 years.\cite{12} A high score on this scale is indicative of high satisfaction with life.

UCLA loneliness scale-short form was developed by Russell et al.,\cite{13} In the current study, a revised a four-item short form version generated by Eskin\cite{14} and applicable to patients 12 years of age or older were used. A higher score is indicative of the higher level of loneliness.

SAS-A was developed by La Greca and Lopez.\cite{15} Turkish validity and reliability studies in adolescents aged 12 years and over were carried out by Aydin and Tekinsav Sutcu and Zorbaz and Dost.\cite{6,16} The scale consists of three subdimensions including fear of negative evaluation (FNE), general social avoidance and distress (SAD-G), and SAD in new situations (SAD-N). A high score from each subscale of the scale indicates that the individual has the feature that the relevant subscale evaluates.\cite{16}

PIUS was developed by Ceyhan et al. to determine PIU among university students.\cite{17} The validity and reliability studies of PIUS-A were conducted by Ceyhan and Ceyhan\cite{5} which consists of 27 items. PIUS-A consists of three subscales: negative consequences of Internet (NCI), social benefit/social comfort (SB/SC), and excessive usage (EU). High scores from the scale indicate a high level of PIU.\cite{5,17}

**Statistical analysis**

The package program was used for data analysis SPSS for Windows Version 22.0 (SPSS Inc, Chicago, IL, USA). Descriptive statistics for the data are given as a mean ± standard deviation, number, and percentage. The normality of the data was evaluated using the Kolmogorov–Smirnov test. The test result indicated that the data had a normal distribution. T-test was used for the comparison of the two group means. Chi-square test was used for the comparison of categorical variables. Analysis of the direction and severity of the
relationship between different variables within the groups was carried out using Pearson correlation analyses. The relationship between Internet usage and problematic Internet use with different technological tools (such as mobile phones or tablets) and the associated psychiatric factors were evaluated by the point-biserial correlation analysis. $P < 0.05$ was considered as statistically significant.

**RESULTS**

The study included 93 adolescents diagnosed with acne vulgaris between the ages of 14 and 18 years. The control group consisted of 93 healthy individuals matched for age and educational level with the case group. There was no statistically significant difference between the two groups in terms of gender, mean age and education level [Table 1].

There was no significant difference between the two groups in terms of loneliness and social anxiety levels, whereas satisfaction with life level of adolescents with acne was significantly lower than the control group. The mean scores of PIU total/subscale were found to be statistically significantly higher in adolescents with acne than in controls. It was found that adolescents with acne showed statistically significantly more PIU; they were overusing the Internet, were more exposed to the negative effects of the Internet and they used the Internet more frequently for SB/SC [Table 2].

The adolescents in both case and control groups had access to the Internet. Eighty (86%) of the adolescents with acne and 79 (84.9%) of the adolescents in the control group had a computer at home and there was no statistically significant difference between the case and control groups ($P = 0.835$). It was determined that 89 of the adolescents with acne (95.7%) and 87 of the adolescents in the control group (93.5%) had mobile phones, with 83 (89.2%) of the adolescents in the case group and 78 (83.9%) of the adolescents in the control group possessed a smartphone. There was no statistically significant difference between the case and control groups in terms of owning a mobile phone or a smartphone. It was found that 86 (92.5%) of the adolescents with acne and 80 (68.0%) of the adolescents in the control group could connect to the Internet through their mobile phones. There was a significant correlation between the use of mobile phones for access to the Internet and the total score for PIU and the scores for PIU-SB/SC of adolescents with acne ($r = 0.288$, $P = 0.005$ and $r = 0.337$, $P = 0.001$, respectively). The problematic use of Internet and the use of Internet for SB/SC increased as the level of use of mobile phones increased in the adolescents with acne.

When the period of daily usage of Internet was examined, 38 (40.9%) adolescents with acne used the Internet for 3–5 h, whereas 24 (25.8%) adolescents in the control group used the Internet for 3–5 h ($P = 0.049$). The duration of daily usage of Internet in the case group was also significantly higher than that of the control group.

| Table 1: Comparison of patients and controls in terms of sociodemographic characteristics, global acne grading system, and Acne Quality of Life scale scores |
|---------------------------------------------|
| **Patient (n = 93)** | **Control (n = 93)** | **P** |
| Age, mean±SD | 16.59±1.42 | 16.65±1.40 | 0.803* |
| Sex, male/female | 22/71 | 22/71 | 1** |
| Education level, n (%) | | | |
| Primary education | 11 (11.8) | 10 (10.8) | 0.898** |
| High school | 60 (64.5) | 63 (67.7) | |
| University | 22 (23.7) | 20 (21.5) | |
| GAGS, n (%) | | | |
| Mild | 49 (52.7) | | |
| Moderate | 39 (41.9) | | |
| Severe | 5 (5.4) | | |
| AQLS, mean±SD | 16.01±5.86 | | |

*Independent samples t-test. **$z$-test. GAGS: Global acne grading system, AQLS: Acne Quality of Life Scale, SD: Standard deviation

| Table 2: Comparison of the Satisfaction with Life Scale, University of California Los Angeles loneliness scale, social anxiety scale for adolescents and subcales; fear of negative evaluation, General Social Avoidance and Distress, Social Avoidance and Distress in New Situations, and Problematic Internet Use Scale and subscales; negative consequences of the Internet, social benefit/social comfort, excessive usage mean scores in patients and controls |
|---------------------------------------------|
| **Patient (n = 93)** | **Control (n = 93)** | **P** |
| SWLS score, mean±SD | 20.37±6.83 | 23.49±6.53 | 0.002* |
| UCLA loneliness score, mean±SD | 7.86±2.35 | 7.24±2.25 | 0.072* |
| SAS-A total score, mean±SD | 43.80±15.57 | 40.44±10.25 | 0.084* |
| SAS-A-FNE | 17.15±7.43 | 15.43±5.33 | 0.072* |
| SAS-A-SAD-G | 10.46±6.48 | 9.43±3.27 | 0.075* |
| SAS-A-SAD-N | 16.19±5.35 | 15.58±4.44 | 0.397* |
| PIUS total score, mean±SD | 62.11±21.78 | 54.05±19.56 | 0.009* |
| PIUS-NCI | 28.77±13.53 | 24.19±11.06 | 0.012* |
| PIUS-SB/SC | 15.35±6.30 | 13.56±5.51 | 0.041* |
| PIUS-EU | 17.98±4.93 | 16.29±5.11 | 0.022* |

*Independent samples t-test. SWLS: Satisfaction with life scale, UCLA: University of California Los Angeles, SAS-A: Social Anxiety Scale for Adolescents, FNE: Fear of negative evaluation, SAD-G: General Social Avoidance and Distress, SAD-N: Social Avoidance and Distress in New Situations, PIUS: Problematic Internet Use Scale, NCI: Negative consequences of the Internet, SB/SC: Social benefit/social comfort, EU: Excessive usage, SD: Standard deviation

Ninety (96.8%) of the adolescents with acne were members of social networking sites compared to 83 (89.2%) of the adolescents in the control group and the difference was statistically significant ($P = 0.044$). Thus, adolescents with acne were significantly more likely to be members of social networking sites.

There was a significant positive correlation between the AQLS and PIU total/subscale scores of the adolescents with
Acne. PIU of adolescents with acne increased as the quality of life decreased. Significant correlations were found between AQLS and SWLS in the negative direction, and SWLS of the adolescents with acne decreased when the quality of life also decreased. Significant correlations were found between SWLS and PIU total/subscale scores in the negative direction in the adolescents with acne. As the satisfaction with life of the adolescents with acne decreased, problematic internet use increased in these acne adolescents increased. Significant positive correlations were found between AQLS and UCLA loneliness scales in the adolescents with acne. The level of loneliness of the adolescents with acne increased as their quality of life decreased. There was a significant positive correlation between the UCLA loneliness scale and the PIU total/subscale scores in the adolescents with acne. Thus, as the level of loneliness increased, the use of PIU increased. There was a significant positive correlation between AQLS and SAS-A total/subscale scores of adolescents with acne and the quality of life of adolescents with acne decreased as the level of social anxiety increased. There was a significant positive correlation between the SAS-A total/subscale and PIU total/subscale scores in adolescents with acne. As the levels of social anxiety increased in adolescents with acne, problematic internet use increased in these acne adolescents increased [Table 3].

**DISCUSSION**

The most important factor in defining addictive Internet usage is the length of time spent on browsing the Internet. As time spent on the Internet increases, the risk of Internet addiction increases. We found that the daily duration of Internet usage and PIU of adolescents with acne were significantly higher. Attempts to reduce the daily duration of Internet usage in adolescents with acne may protect these individuals from the transition to Internet dependence.

Social withdrawal is a psychiatric problem associated with acne. Lesions in the visible regions of the body were reported to have a negative effect on body image and level of social anxiety. As the Internet provides opportunities for individuals to look the way they want to and stay away from social worries, people who have restrictions about social life feel more comfortable in the virtual environment. In our study, it was determined that the level of social anxiety and PIU increased as the quality of life decreased in adolescents with acne. The negative impact of acne on the quality of life may increase the level of social anxiety in these adolescents. Adolescents with acne may attempt to meet their social needs in the Internet environment that they otherwise cannot meet in real life due to increased social concerns. While turning to the Internet as a strategy to cope with reducing social concerns may have a positive impact on the levels of social anxiety, it may also facilitate the transition of these adolescents to PIU. The level of social anxiety, memberships of social sharing sites, and use of the Internet for SB/SC were similar between the adolescents with acne and the control group. However, exacerbation of PIU in adolescents with acne was supported by the fact that the increase in PIU of these individuals matched their increase in social anxiety.

The purpose of using the Internet is one of the most important variables that predicts Internet dependency; for example, the use of Internet for social interaction/communication is considered to be a powerful variable. In the present study, it was determined that the use of the Internet for SB/SC and membership of social sharing sites were significantly higher in adolescents with acne. Thus, when social interaction is the purpose of Internet usage, adolescents with acne may be considered to be at risk from addiction.

The negative effects of acne on the social lives of young people have been discussed in the literature. Adolescents with acne have been reported to avoid sports activities as they were ashamed of their lesions. To cope with acne, the individual may prefer to avoid social environments and this may cause him/her to become introverted. Interestingly, we observed in the current study that loneliness levels of adolescents with acne did not differ from the control group; however, the level of loneliness was found to increase as the quality of life decreased in the adolescents with acne. Therefore, the negative impact of acne on quality of life may increase loneliness levels of

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**Table 3: Correlations between Problematic Internet Use Scale, subscales; negative consequences of the Internet, social benefit/social comfort, excessive usage, and Social Anxiety Scale for Adolescents, subscales; fear of negative evaluation, General Social Avoidance and Distress, Social Avoidance and Distress in New Situations, University of California Los Angeles loneliness scale, Satisfaction with Life Scale, Acne Quality of Life Scale**

|                      | PIUS total (r) | PIUS–NCI (r) | PIUS–SB/SC (r) | PIUS–EU (r) | AQLS (r) |
|----------------------|---------------|--------------|----------------|-------------|----------|
| SAS-A total         | 0.524**       | 0.471**      | 0.482**        | 0.407**     | 0.647**  |
| SAS-A-FNE           | 0.423**       | 0.362**      | 0.402**        | 0.364**     | 0.614**  |
| SAS-A-SAD-G         | 0.561**       | 0.536**      | 0.476**        | 0.390**     | 0.646**  |
| SAS-A-SAD-N         | 0.467**       | 0.419**      | 0.445**        | 0.345**     | 0.206*   |
| UCLA-loneliness     | 0.310**       | 0.261*       | 0.311**        | 0.254*      | 0.531**  |
| SWLS                | −0.301**      | −0.273**     | −0.291**       | −0.209*     | −0.351** |
| AQLS                | 0.498**       | 0.469**      | 0.474**        | 0.305**     | 1.000    |

*P<0.05, **P<0.01. PIUS: Problematic Internet Use Scale, NCI: Negative consequences of the Internet, SB/SC: Social benefit/social comfort, EU: Excessive usage, SAS-A: Social Anxiety Scale for Adolescents, FNE: Fear of negative evaluation, SAD-G: General Social Avoidance and Distress, SAD-N: Social Avoidance and Distress in New Situations, SWLS: Satisfaction with Life Scale, AQLS: Acne Quality of Life Scale, UCLA: University of California Los Angeles
adolescents with acne. It is suggested that individuals who cannot socialize tend to get the support that they cannot get from their own social environment from the Internet. In one study, it was determined that adolescents who use the Internet to alleviate their loneliness are more likely to develop PIU. In our study, we found that PIU increased as loneliness levels of adolescents with acne increased. Thus, in accordance with the literature, it can be considered that as the loneliness levels of the adolescents with acne increases, their tendency to turn to the Internet as a coping strategy increases, thereby potentially transitioning these adolescents to problematic Internet use.

The negative relationship between PIU and satisfaction with life is mentioned in the literature. It was reported that individuals prefer to spend more time on the Internet as a means to escape from the dissatisfaction they experience with themselves and their lives and to improve their satisfaction with life. However, spending more time on the Internet to escape from insufficiencies in life is seen as an important factor in increasing the likelihood of PIU. Accordingly, the Internet has turned into a pretext for not coming face to face with the source of dissatisfaction, leading to PIU. In our study, it was determined that the level of satisfaction with life of adolescents with acne was significantly lower than that of the control group, and that quality of life decreased as the levels of satisfaction with life decreased; accordingly, PIU increased as the satisfaction with life levels decreased. Adolescents with acne who have low satisfaction with life levels may develop PIU by deviating from real life to the virtual world. In addition, it should not be forgotten that PIU is the step prior to Internet dependency. In one study, it was found that satisfaction with life level of Internet addicted adolescents was higher than nondependent adolescents. In this study, it was also stated that the use of Internet had a positive impact on satisfaction with life but this positive effect could also be the factor to push the individual to addiction over time.

Our study has some limitations. The first of these limitations is that the findings cannot be generalized as the study was conducted on adolescents aged 14–18 years who applied to a Dermatology Polyclinic in a University Hospital. The second is the use of self-report based measurement scales as a data collection tool. Therefore, the findings are limited to the answers given by the participants to the scales. A third limitation of the study is the inability to determine which of the cause and effect pair started first; this is a general limitation of case–control studies. The low case number is another limitation of this study.

**Conclusion**

In this study, although there was no significant difference in social anxiety/loneliness levels between the case and control groups, satisfaction with life level of adolescents with acne was significantly lower than the control group. In addition, we found that PIU, duration of daily Internet usage, use of Internet for SB/SC, memberships of social sharing sites, and exposure to the negative results of the Internet were more frequent in adolescents with acne. Considering these findings, it can be concluded that adolescents with acne are a high risk group for the development of Internet addiction. Our results showed that as the quality of life of adolescents with acne decreased, satisfaction with life decreased and social anxiety/loneliness levels increased. In addition, it was determined that as the satisfaction with life levels of the adolescents with acne decreased, the level of loneliness/social anxiety increased, and PIU increased. The negative impact of acne on the quality of life, satisfaction with life, loneliness, and social anxiety levels may lead to the transition of adolescents with acne to PIU. In adolescents with acne, access to the Internet through mobile phones increased PIU in these individuals. According to our knowledge, our study is the first to investigate the relationship between psychosocial variables (quality of life/satisfaction with life/social anxiety/loneliness) and PIU in adolescents with acne. Longitudinal studies will be more useful to understand the developmental pattern of PIU in adolescents with acne.

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**Conflicts of interest**

There are no conflicts of interest.

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