

INVESTIGATIVE REPORT

Itch and Pain in Adolescents are Associated with Suicidal Ideation: A Population-based Cross-sectional StudyJon Anders HALVORSEN^{1,2}, Florence DALGARD², Magne THORESEN³, Espen BJERTNESS^{2,4} and Lars LIEN^{5,6}¹Department of Dermatology, Oslo University Hospital Rikshospitalet, Faculty of Medicine, ²Institute of General Practice and Community Medicine,³Department of Biostatistics, Institute of Basic Medical Sciences, University of Oslo, ⁴Tibet University Medical College, Lhasa, Tibet, China, ⁵Division of Mental Health and Addiction, University of Oslo and Oslo University Hospital, Oslo, and ⁶Hospital Trust Innlandet, Brumunddal, Norway

The association between itch and suicidal ideation has not been explored previously in the general population. The aim of the present study is to analyse the association between itch and suicidal ideation in adolescents, and to compare the findings with an expected association between pain and suicidal ideation in the same sample. A total of 4,744 adolescents were invited to join the questionnaire-based study. The participation rate was 80%. The prevalence of suicidal ideation among those who reported no itch was 8.4% vs 21.1% among those who reported severe itch. Significant association between itch and suicidal ideation was found in a multivariate model (odds ratio 3.0, 95% confidence interval (CI) 2.1–4.2) and between pain and suicidal ideation (odds ratio 3.8, 95% CI 2.6–5.7). The findings were similar and statistically significant in girls and boys separately. Itch and pain are approximately equally strongly associated with suicidal ideation in a large general population of adolescents. Key words: itch; pruritus; pain; suicidal ideation; suicide; depression.

(Accepted August 17, 2011.)

Acta Derm Venereol 2012; 92: 543–546.

Jon Anders Halvorsen, Department of Dermatology, Oslo University Hospital Rikshospitalet, NO-0027 Oslo, Norway. E-mail: j.a.halvorsen@medisin.uio.no, jander-h@online.no

Chronic diseases are associated with increased psychological distress (1). Suicidal ideation, i.e. having suicidal thoughts, is an indicator of extreme psychological distress, and is defined as any self-reported thoughts of engaging in suicide-related behaviour (2–4).

Itch, also known as pruritus, is the most prevalent symptom of chronic skin diseases and is associated with psychological distress in both adults and adolescents (5, 6). An increased prevalence of suicidal ideation has been found in small samples of patients with dermatological diseases (7–10). However, a possible association between itch and suicidal ideation has, as far as we are aware, not been analysed earlier in any age group in a general population.

Chronic pain is common, and is associated with psychological distress including suicidal ideation (11,

12). Studies have shown that suicidal ideation was on average three times more common in those with pain compared with controls without pain (11).

Pain and itch are both aversive sensory sensations that are indicators of physical illness, and at the same time influenced by psychological factors (13). Pain is a widely studied symptom and there are many treatment options for patients with pain, in contrast to itch, which is less studied and has fewer treatment alternatives. There is a need to explore and demonstrate different aspects of itch-related problems. This may eventually lead to more research and resources being allocated to patients who have itchy symptoms and diseases.

The primary aim of this study was to investigate the association between itch and suicidal ideation. The secondary aim was to investigate the association between pain and suicidal ideation, and compare this to findings in itch.

METHODS

Participants and study design

The design of the study was cross-sectional and questionnaire-based. The study was conducted by the University of Oslo in cooperation with the Norwegian Institute of Public Health and the Regional Centre for Child and Adolescent Mental Health, Eastern and Southern Norway.

In 2004, all pupils (mainly born in 1986 and thus 18 or 19 years old) in Oslo in their final year of schooling, were invited to participate. This part of the study was conducted at schools. In addition, 1,085 adolescents in Oslo aged 18 or 19 years who were not in their final year (not attending school or were in a different school year) were invited by post to participate and 467 (43%) returned the questionnaire. In total, 4,744 adolescents were invited and 3,775 (80%) completed the questionnaire. Details about participants and study design are found in previous publications (6, 14–17).

Dependent variable

Suicidal ideation was assessed using the question. “In the course of the last week (including today), have you been troubled by thoughts about ending your life?” Four possible answers were dichotomized into “Not troubled” vs “Slightly troubled”, “Much troubled” and “Very much troubled”. The question was taken from the 90-question version of the Hopkins Symptom Checklist (HSCL-90), a well-established instrument for use in epidemiological studies (3).

Independent variables

Itch was assessed with one validated question, and was worded as follows: "During last week, did you have itchy skin?" The possible answers about this were "No", "Yes, a little", "Yes, quite a lot" and "Yes, very much" (18). In the regression analyses, the variable itch was categorized into three: no itch, a little itch, severe itch (quite a lot and very much)

Pain was assessed using five separate questions: "Have you in the course of the last 12 months been troubled several times by pain in your head (headache, migraine, etc.), neck/shoulder, arms/legs/shoulders, stomach, back". Two answers were possible: "Yes" or "No". In the regression analyses, the five variables were collapsed into one variable with three different categories: no pain site, one or two pain sites, and three to five pain sites.

Confounders

Family income and ethnicity were selected as confounders because they are possible risk factors for suicide and suicide attempts (19), and because itch is associated with both family income and ethnicity in this sample (6). The variables concerning family income and ethnicity were obtained from Statistics Norway. Family income is the total of both parents' gross income and has been divided into two categories: ≥ 0.75 million Norwegian kroner (NOK) and < 0.75 million NOK. 0.75 million NOK is approximately 100,000 Euros. Western Europe, North America and Australia are considered Western countries in the analyses.

Ethics

The study protocol was evaluated by the Regional Committee for Medical Research Ethics and approved by the Norwegian Data Inspectorate and the educational authorities in Oslo. It was conducted in full accordance with the World Medical Association's Declaration of Helsinki. Written and informed consent was obtained from all the participants.

Statistics

SPSS for Windows version 16.0 was used for the statistical analyses. A χ^2 test for trend was used to test for trend over increasing levels of itch and pain. Odds ratios (OR) were calculated in both crude and adjusted logistic regression models. The level of significance was set at $p < 0.05$ and 95% confidence intervals (CI) were calculated. There were 3,591 respondents for itch and suicidal ideation, and 3,475 for chronic pain and suicidal ideation. In the regression analyses identical samples were used in both the crude and adjusted models: since the missing percentages were higher for pain than for itch, the sample for suicidal ideation and itch was 3,015 and for suicidal ideation and chronic pain 2,927.

RESULTS

A total of 3,682 respondents answered the question regarding suicidal ideation (93 missing). In the sample 402 (10.9%, 95% CI 8.1–13.7%) of the adolescents reported suicidal ideation, 120 boys (7.4%, 95% CI 3.9–10.9%) and 282 girls (13.7%, 95% CI 10.7–16.7%).

Of those who reported severe itch 21.1% had suicidal ideation, compared with 8.4% of those with no itch. Of those who reported three to five pain sites 17.7% had suicidal ideation compared with 4.1% of those with no reported pain. Statistically significantly increases

in suicidal ideation, were seen in itch and pain, and in both genders separately (Tables SI and SII; available from: <http://www.medicaljournals.se/acta/content/?doi=10.2340/00015555-1251>).

Significant adjusted associations between suicidal ideation and severe itch were found in the whole sample (OR 3.0, 95% CI 2.1–4.2), and separately in boys (OR 4.2, 95% CI 2.4–7.3) and girls (OR 3.9, 95% CI 2.1–7.3) (Table I). The adjusted OR of suicidal ideation increased significantly with increasing severity of itch ($p_{\text{trend}} < 0.01$).

Significant adjusted associations between suicidal ideation and three to five pain sites were found in the whole sample (OR 3.8, 95% CI 2.6–5.7), and separately in boys (OR 4.6, 95% CI 2.6–7.9) and girls (OR 4.2, 95% CI 2.3–7.7) (Table II). The adjusted OR of suicidal ideation increased significantly with increasing number of pain sites ($p_{\text{trend}} < 0.01$).

No statistical interaction was found between sex and itch or sex and pain, with suicidal ideation as the dependent variable.

DISCUSSION

This study showed that itch was strongly associated with suicidal ideation in a large general population of adolescents. In the same population an association between pain and suicidal ideation was found to be about equally strong as the association between itch and suicidal ideation.

There were a few studies that had found increased level of suicidal ideation in patients with itchy skin diseases, such as psoriasis (8) and atopic dermatitis (7, 9). The present results were supported by findings in clinical populations, and showed, to our knowledge for the first time in a large general population, an associa-

Table I. *Odd ratios (OR) for suicidal ideation in crude and adjusted logistic models with itch as independent variable in the whole sample (n = 3,015), and among boys (n = 1,327) and girls (n = 1,688)*

	Crude OR (95% CI)	Adjusted OR (95% CI)
Both sexes		
No itch	1.0	1.0
A little itch	1.8 (1.3–2.3)	1.6 (1.2–2.1) ^a
Severe itch*	3.5 (2.5–4.9)	3.0 (2.1–4.2) ^a
Boys		
No itch	1.0	1.0
A little itch	1.6 (0.9–2.7)	1.5 (0.9–2.6) ^b
Severe itch*	4.8 (2.6–8.7)	4.6 (2.5–8.4) ^b
Girls		
No itch	1.0	1.0
A little itch	1.7 (1.2–2.4)	1.6 (1.2–2.3) ^b
Severe itch*	2.7 (1.2–2.4)	2.5 (1.7–3.8) ^b

*Severe itch includes self-reported "quite a lot" and "very much" itch (see Methods).

^aAdjusted for family income, ethnicity and sex (see Methods).

^bAdjusted for family income and ethnicity (see Methods).

CI: confidence interval.

Table II. *Odd ratios (OR) for suicidal ideation in crude and adjusted logistic models with pain as independent variable in the whole sample (n = 2,927), and among boys (n = 1,305) and girls (n = 1,622)*

	Crude OR (95% CI)	Adjusted OR (95% CI)
Both sexes		
No pain site	1.0	1.0
One or two pain sites	1.5 (1.0–2.2)	1.4 (0.9–2.0) ^a
Three to five pain sites*	4.7 (3.2–6.8)	3.8 (2.6–5.7) ^a
Boys		
No pain site	1.0	1.0
One or two pain sites	1.3 (0.7–2.2)	1.2 (0.7–2.1) ^b
Three to five pain sites*	4.6 (2.6–7.9)	4.2 (2.4–7.3) ^b
Girls		
No pain site	1.0	1.0
One or two pain sites	1.5 (0.8–2.9)	1.5 (0.8–2.9) ^b
Three to five pain sites*	4.2 (2.3–7.7)	3.9 (2.1–7.3) ^b

*There were five possible pain sites: head, neck/shoulder, arms/legs/shoulders, stomach, and back (see Methods).

^aAdjusted for family income, ethnicity and sex (see Methods).

^bAdjusted for family income and ethnicity (see Methods).

CI: confidence interval.

tion between itch and suicidal ideation. The prevalence of both itch and suicidal ideation was in line with other studies (20–22).

Previously, the prevalence of suicidal ideation in patients with chronic pain has been shown to be approximately 20% (11). In a large Canadian general population statistically significant associations were found between suicidal ideation and each of migraine, arthritis and back problems (12). In a small, longitudinal, Finnish study, earlier back pain among farmers produced a nine-fold increase in suicide (23). Our results underscored pain as indicator of mental-health problems and demonstrated, probably for the first time, an association between pain and suicidal ideation in an exclusively adolescent population.

Suicidal ideation was about equally strongly associated with itch and pain. This indicated that the psychological distress in itch can be as severe as in pain. Such a comparison was, to our knowledge, not performed previously and underscores itch as a potential very bothersome symptom. However, in this study there were differences in the measurement of itch and pain, which made a direct, but still meaningful, comparison problematic.

Suicidal ideation and depression are related, and the prevalence of depressive disorders among adolescent suicide victims ranged from 49% to 64% (19). In a longitudinal study of patients hospitalized because of suicidal ideation, severity of depression did not differentiate between those ultimately committing suicide and those not committing suicide (24). We did not include symptoms of depression and anxiety (mental distress) in our multivariate analyses, since in our opinion suicidal ideation was another aspect of mental health problems other than depression. However, when we included mental distress in the multivariate analy-

ses the associations remained statistically significant, with an OR of 1.5 (95% CI 1.1–2.2) between suicidal ideation and severe itch, and with an OR of 1.8 (95% CI 1.3–2.5) between suicidal ideation and three to five pain sites. Mental distress was measured by 10 questions with the psychometric instrument Hopkins Symptom Checklist-10 (HSCL-10) (25). In addition, as depression can precede suicidal ideation, it can be an intermediate variable, and should thus not be included in the multivariate analyses (26).

The strengths of our study were the non-treatment-seeking sample and the relatively high participation rate (80%). This reduced the chance of random errors and bias. Further strengths were the use of validated questions and the inclusion of register data about income and ethnicity.

The present study had some limitations. The cross-sectional design limits the interpretation of the directions of causality. As for any observational study, there is a risk for residual confounding. We can only speculate in possible sources, but personality traits can, for example, be an unmeasured confounder, and improper categorization of, for example, ethnicity, can also result in residual confounding. Another concern was the number of missing in the regression analyses, which was mainly due to the high number of missing observations about family income. When comparing the results for itch and pain, one should remember that, while itch was reported in terms of intensity and over the last week, pain was reported in number of pain sites and over the last year.

In conclusion, this study demonstrates an association between itch and suicidal ideation in a general adolescent population. In the same sample we have found associations between pain and suicidal ideation. Itch and pain are about equally strongly associated with suicidal ideation. These findings add to the literature of the burden of the symptoms of itch and pain and should encourage health planners to increase the health services to young patients presenting with somatic symptoms, including itch. These results should be explored further in clinical samples.

ACKNOWLEDGEMENTS

The data collection for the study was carried out and funded by the Norwegian Institute of Public Health, the University of Oslo and the Centre for Child and Adolescent Mental Health, Eastern and Southern Norway. The authors would like to thank Petter Gjersvik for editorial advice.

The authors declare no conflicts of interest.

REFERENCES

1. Moussavi S, Chatterji S, Verdes E, Tandon A, Patel V, Ustun B. Depression, chronic diseases, and decrements in health: results from the World Health Surveys. *Lancet* 2007; 370:

- 851–858.
2. Evans E, Hawton K, Rodham K. Factors associated with suicidal phenomena in adolescents: A systematic review of population-based studies. *Clin Psychol Rev* 2004; 24: 957–979.
 3. Lipman RS, Covi L, Shapiro AK. The Hopkins Symptom Checklist (HSCL) – factors derived from the HSCL-90. *J Affect Disord* 1979; 1: 9–24.
 4. O’Carroll PW, Berman AL, Maris RW, Moscicki EK, Tanney BL, Silverman MM. Beyond the Tower of Babel: a nomenclature for suicidology. *Suicide Life-Threat Behav* 1996; 26: 237–252.
 5. Dalgard F, Lien L, Dalen I. Itch in the community: associations with psychosocial factors among adults. *J Eur Acad Dermatol Venereol* 2007; 21: 1215–1219.
 6. Halvorsen JA, Dalgard F, Thoresen M, Thoresen M, Bjertness E, Lien L. Itch and mental distress: a cross-sectional study among late adolescents. *Acta Derm Venereol* 2009; 89: 39–44.
 7. Dieris-Hirche J, Gieler U, Kupfer JP, Milch WE. Suizidge-danken, Angst und Depression bei erwachsenen Neuroder-mitikern. *Hautarzt* 2009; 60: 641–646.
 8. Zachariae R, Zachariae C, Ibsen HH, Mortensen JT, Wulf HC. Psychological symptoms and quality of life of derma-tology outpatients and hospitalized dermatology patients. *Acta Derm Venereol* 2004; 84: 205–212.
 9. Kimata H. Prevalence of suicidal ideation in patients with atopic dermatitis. *Suicide Life-Threat Behav* 2006; 36: 120–124.
 10. Gupta MA, Gupta AK. Depression and suicidal ideation in dermatology patients with acne, alopecia areata, atopic der-matitis and psoriasis. *Br J Dermatol* 1998; 139: 846–850.
 11. Tang NK, Crane C. Suicidality in chronic pain: a review of the prevalence, risk factors and psychological links. *Psychol Med* 2006; 36: 575–586.
 12. Ratcliffe GE, Enns MW, Belik SL, Sareen J. Chronic pain conditions and suicidal ideation and suicide attempts: an epidemiologic perspective. *Clin J Pain* 2008; 24: 204–210.
 13. Gieler U, Niemeier V, Brosig B, Kupfer J. Psychosomatic aspects of pruritus. *Dermatol Psychosom* 2002; 3: 6–13.
 14. Dalgard F, Gieler U, Holm JO, Bjertness E, Hauser S. Self-esteem and body satisfaction among late adolescents with acne: results from a population survey. *J Am Acad Dermatol* 2008; 59: 746–751.
 15. Halvorsen JA, Dalgard F, Thoresen M, Bjertness E, Lien L. Is the association between acne and mental distress in-fluenced by diet? Results from a cross-sectional population study among 3775 late adolescents in Oslo, Norway. *BMC Public Health* 2009; 9: 340.
 16. Halvorsen JA, Stern RS, Dalgard F, Thoresen M, Bjertness E, Lien L. Suicidal ideation, mental health problems, and social impairment are increased in adolescents with acne: a population-based study. *J Invest Dermatol* 2011; 131: 363–370.
 17. Sagatun A, Sogaard A-J, Bjertness E. Youth 2004. Material and methods (online) [cited 2006 August 28]. Available from: <http://www.fhi.no/dav/A34847D246.pdf>.
 18. Halvorsen JA, Braae OA, Thoresen M, Holm JO, Bjertness E, Dalgard F. Comparison of self-reported skin complaints with objective skin signs among adolescents. *Acta Derm Venereol* 2008; 88: 573–577.
 19. Gould MS, Greenberg T, Velting DM, Shaffer D. Youth suicide risk and preventive interventions: a review of the past 10 years. *J Am Acad Child Adol Psychiatry* 2003; 42: 386–405.
 20. Nock MK, Borges G, Bromet EJ, Alonso J, Angermeyer M, Beautrais A, et al. Cross-national prevalence and risk factors for suicidal ideation, plans and attempts. *Br J Psychiatry* 2008; 192: 98–105.
 21. Bridge JA, Goldstein TR, Brent DA. Adolescent suicide and suicidal behavior. *J Child Psychol Psychiatry* 2006; 47: 372–394.
 22. Weisshaar E, Dalgard F. Epidemiology of itch: adding to the burden of skin morbidity. *Acta Derm Venereol* 2009; 89: 339–350.
 23. Penttinen J. Back pain and risk of suicide among Finnish farmers. *Am J Public Health* 1995; 85: 1452–1453.
 24. Beck AT, Steer RA, Kovacs M, Garrison B. Hopelessness and eventual suicide: a 10-year prospective study of pa-tients hospitalized with suicidal ideation. *Am J Psychiatry* 1985; 142: 559–563.
 25. Strand BH, Dalgard OS, Tambs K, Rognerud M. Measuring the mental health status of the Norwegian population: a comparison of the instruments SCL-25, SCL-10, SCL-5 and MHI-5 (SF-36). *Nord J Psychiatry* 2003; 57: 113–118.
 26. Rothman KJ, Greenland S, Lash TL. *Modern epidemiology*. Philadelphia: Lippincott Williams & Wilkins; 2008.