

ORIGINAL ARTICLE

Relationship between anger and pruritus perception in patients with chronic idiopathic urticaria and psoriasis

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Abstract

Background There is evidence that chronic idiopathic urticaria (CIU) and psoriasis are associated with personality based difficulties in emotional regulation particularly with regard to the feeling of anger. This deficit in emotional awareness could lead to the phenomenon that emotions are rather experienced in bodily symptoms such as pruritus.

Aim We investigated whether there is a relationship between pruritus as major symptoms in CIU and psoriasis and the experience of negative emotions.

Setting Forty-one CIU patients and 44 psoriasis patients treated at Bonn University Hospital and 49 healthy controls were included.

Method Patients and controls were compared on questionnaires measuring alexithymia (TAS-20), emotional distress (SCL-90-R) and anger (STAXI). In skin-disordered patients, separate stepwise regressions with pruritus severity as dependent variable and questionnaires, skin status, duration, sex and age as independent variables were calculated.

Results CIU and psoriasis patients showed higher alexithymia, emotional distress, depression, anxiety and state anger compared with controls. State anger was the only significant predictor of pruritus severity in CIU explaining 19% of variance. Depression was the only significant predictor of pruritus severity in psoriasis explaining 12% of variance.

Conclusions Our findings suggest a relationship between pruritus severity and anger in CIU. Furthermore, our results indicate a relationship between pruritus severity and depression in psoriasis.

Introduction

Despite a lot of research on the causes of chronic idiopathic urticaria (CIU), the aetiology is still largely unknown.¹ Recent studies suggest in a subgroup of CIU patients autoimmune processes as significant pathomechanisms. Thus, approximately one-third of patients with CIU have autoantibodies against the high-affinity IgE receptor or IgE in their blood.^{2,3} However, it is not clear whether CIU with autoantibodies can be classified as an autoimmune disease.² The role of psychological factors such as personality traits or

psychopathological symptoms in the development of CIU has also been investigated in several studies. As far as psychopathological symptoms are concerned, patients have been described as more anxious and depressed in comparison with healthy controls or in comparison to other dermatological patients.⁴⁻⁷ However, it is not clear whether these symptoms are causes or consequences of the disease. With regard to personality traits, several studies found a difficulty in dealing with aggression/anger in patients with CIU. These patients were not able to adequately identify, express and communicate these feelings.^{4,5} This difficulty in affect regulation is typical for

Table 1 Characteristics of skin disorders

	Psoriasis (N = 44), mean $\pm$ SD	Urticaria (N = 41), mean $\pm$ SD
Duration of skin disorder (years)	14.4 $\pm$ 11.6	6.0 $\pm$ 6.8*
Skin status†	9.7 $\pm$ 3.9	7.2 $\pm$ 3.7*
Pruritus severity‡	2.2 $\pm$ 1.2	2.6 $\pm$ 1.1

* $P < 0.01$, †sum scale (5 items) ranging from 0 to 15, ‡scale ranging from 1 to 5.

a personality trait described as alexithymia (literally: no words for emotions), which means a deficit in identification and communication of emotions, and a recent study found significantly higher alexithymia scores in comparison with healthy controls in CIU.⁸ Alexithymia in skin-disordered patients is associated with higher emotional distress and a wide range of psychopathology.⁹ It is assumed that the deficit in emotional awareness might lead to the phenomenon that emotions are rather experienced in bodily symptoms and physical actions.¹⁰ In skin disorders, pruritus can be such a bodily symptom.¹⁰

Assuming a pervading emotion recognition deficit in chronic urticaria, we think of certain similarities in personality structure to psoriasis patients. In this skin disorder, a higher prevalence of alexithymia is connected with difficulties in communicating anger.^{11,12} The established role of psychological factors including alexithymia and anger in psoriasis patients provided the rationale for investigating psoriasis patients as a comparison group in our study.

We wanted to investigate the following hypotheses:

Patients with CIU and psoriasis show higher alexithymia, as well as emotional distress, depression and anxiety compared to healthy controls. Furthermore, patients in both skin disorders tend to be angry and have at the same time difficulties in the expression of anger. Provided that CIU and psoriasis patients show difficulties in emotional regulation, we hypothesized finally that a significant part of variance in pruritus perception in both skin disorders can be explained by negative affect such as anger and/or depression.

Method

Patients

Study method was approved by the local Ethics Committee. We asked 55 consecutive inpatients from the Department of Dermatology at Bonn University Hospital with CIU without coexisting other form of urticaria (e.g. physical urticaria) to take part in the study. Patients were assigned to this urticarial subgroup after full clinical

assessment, physical challenge testing including tests for dermatographism, heat and cold, vibration, contact with water, pressure, exposure to light, exercise and skin biopsies if indicated.¹³ Nine patients denied to take part because of miscellaneous reasons (not interested, poor German language). Furthermore, 5 patients had to be excluded from our final analysis because of incomplete questionnaires. Thus, finally we could include 41 inpatients with CIU in our analysis.

This group was compared with a group of psoriasis patients. We asked 52 consecutive psoriasis inpatients from the Department of Dermatology at Bonn University Hospital. Six patients denied to take part, because of miscellaneous reasons (not interested, no time). Furthermore, 2 patients had to be excluded because of incomplete questionnaires.

Thirty-six psoriasis patients (82%) showed greater than 10% of affected body surface area,¹⁴ and 35 CIU patients (85%) showed at least moderate pruritus and more than 20 wheals daily,¹⁵ which means the majority of patients with psoriasis and CIU showed moderate to high severity of disease.^{14,15} Table 1 gives a brief survey about duration of illness, skin status and subjective assessment of pruritus severity in patients with CIU and psoriasis.

Psoriasis patients showed a significantly longer duration of illness and a higher score concerning skin status compared to CIU patients.

As a control group, we used a group of 49 age and gender matched healthy volunteers, which were recruited by advertisements to take part in a psychological study. Only volunteers without any current psychiatric or organic illness were included.

Sociodemographic characteristics of all three groups are given in Table 2.

There were no significant differences between the three groups with regard to sociodemographic characteristics.

Measures

Demographic variables were assessed with a general checklist, assessing patients' gender, age, marital status and educational level.

Table 2 Sociodemographic characteristics

	Psoriasis (N = 44)	Urticaria (N = 41)	Control group (N = 49)
Age	45.0 (SD 17.3)	49.6 (SD 18.5)	46.3 (SD 14.6)
Gender			
Male	20 (45.5%)	9 (21.9%)	14 (28.6%)
Female	24 (54.5%)	34 (78.1%)	35 (71.4%)
Education			
No formal education	2 (4.5%)	2 (4.9%)	0 (0%)
Secondary school graduate	36 (81.8%)	34 (82.9%)	33 (67.3%)
A levels	6 (13.6%)	5 (12.2%)	16 (32.6%)
Occupation			
Others	1 (2.3%)	2 (4.9%)	0 (0%)
Blue-collar worker	24 (54.5%)	22 (53.7%)	22 (44.9%)
White-collar worker	10 (22.8%)	10 (24.4%)	23 (46.9%)
Private entrepreneur	9 (20.5%)	7 (17.1%)	4 (8.2%)

The patients were asked to rate the severity of the pruritus that they were experiencing at the time they were completing the study questionnaire. The patients with CIU and psoriasis rated the following items, respectively, on a 5-point scale: 'Itching due to urticaria at the present time' or 'Itching due to psoriasis at the present time'. The 5-point scale consisted of a line with equal sections. Each of the sections were labelled numerically with a rating of '1' denoting 'not at all' and a rating of '5' denoting 'very severe'.

Skin status was assessed with a 5-item scale, measuring the degree to which five different parts of the body (face, hairy scalp and neck, extremities, torso, genitals/anus) were affected by the disease, with response categories on a 4-point scale (0 = not; 1 = a little; 2 = moderately; 3 = strongly). A total score for the affected areas of the body was calculated by adding up the scores of the five items. Moreover, duration of the skin disorder was assessed.

Psychological distress and psychopathological symptoms were assessed with the German version¹⁶ of the Symptom Checklist 90-R, SCL-90-R.¹⁷ The Symptom Checklist 90-R generates nine primary symptom dimensions (i.e. somatization, obsessive-compulsive, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, and psychoticism) as well as a sum score (Global Severity Index) measuring psychological distress. The Symptom Checklist 90-R is a reliable measure and is reported to have adequate indices of concurrent criterion orientated validity, as well as construct validity.

Alexithymia was measured dimensionally using the German version of the Twenty-Item Toronto Alexithymia Scale, TAS-20,¹⁸ which was originally developed by Bagby and colleagues.¹⁹ The German version of the Toronto Alexithymia Scale is a 20-item self-report instrument that

has been shown to have good internal consistency [Cronbach's $\alpha = 0.70$ (sum value alexithymia)], good reliability, as well as construct and criterion validity to measure alexithymic characteristics.¹⁸

State anger, trait anger and anger expression were assessed by the German version²⁰ of the State trait anger expression inventory (STAXI).²¹ This measure distinguishes state anger and trait anger, and further distinguishes between the experience of anger and the expression of anger. Subscales can be derived to assess whether individuals tend to keep in their anger (anger-in), or express their anger openly (anger-out), or whether individuals effectively control and reduce their feelings of anger (anger-control). This measure and its subscales have been found to exhibit good psychometric properties.^{20,21}

Analysis

Descriptive statistics was given for clinical and sociodemographic data as well as psychometric tests. ANOVA, ANCOVA, *t*-tests and chi-squared tests were used depending on scale level to analyse group differences. To control for cumulative alpha error post hoc tests were calculated according to Tukey. Correlations were calculated according to Pearson. Results with $P < 0.05$ were regarded as significant. Finally, a stepwise multiple regression analysis was calculated, which is described in detail in the results section.

Results

First, we wanted to investigate the hypothesis that controlling for depression patients with CIU and psoriasis show higher alexithymia sum scores as measured by the TAS-20 sum score compared with healthy controls

Table 3 Results of the Twenty-Item Toronto Alexithymia Scale (TAS-20) (ANCOVA, covariate depression)

	Group 1 (N = 44)		Group 2 (N = 41)		Group 3 (N = 49)						
	Psoriasis		Urticaria		Control group						
TAS-20	Mean	SD	Mean	SD	Mean	SD	F	P	post hoc comparison	post hoc comparison	post hoc comparison
F1	18.3	±5.8	15.9	±6.5	11.5	±4.3	6.32	0.002	ns	2 > 3*	1 > 3**
F2	12.7	±4.6	12.9	±4.2	9.7	±3.9	3.52	0.032	ns	2 > 3*	ns
F3	20.2	±5.5	19.4	±5.0	16.2	±5.3	3.38	0.037	ns	2 > 3*	ns
Sum	51.4	±11.8	48.2	±11.7	37.4	±10.7	7.78	0.001	ns	2 > 3**	1 > 3**

* $P < 0.05$, ** $P < 0.01$.**Table 4** Results of the Symptom Checklist 90-R (SCL 90-R)

	Group 1		Group 2		Group 3		F	P	Group 1 vs. 2	Group 2 vs. 3	Group 1 vs. 3
	Psoriasis		Urticaria		Control group						
	Mean	SD	Mean	SD	Mean	SD					
SCL-90-R	Mean	SD	Mean	SD	Mean	SD	F	P	post hoc comparison	post hoc comparison	post hoc comparison
Somatization	0.81	±0.64	0.70	±0.70	0.30	±0.30	14.01	0.000	ns	2 > 3**	1 > 3**
Obsessive–compulsive	0.94	±0.73	0.71	±0.71	0.36	±0.36	10.54	0.000	ns	2 > 3*	1 > 3**
Interpersonal sensitivity	0.93	±0.77	0.44	±0.44	0.33	±0.33	13.85	0.000	1 > 2**	ns	1 > 3**
Depression	1.10	±0.80	0.70	±0.70	0.31	±0.31	18.74	0.000	1 > 2**	2 > 3*	1 > 3**
Anxiety	0.74	±0.66	0.54	±0.54	0.19	±0.19	12.86	0.000	ns	2 > 3**	1 > 3**
Hostility	0.76	±0.81	0.39	±0.39	0.21	±0.21	12.01	0.000	1 > 2**	ns	1 > 3**
Phobic anxiety	0.58	±0.71	0.23	±0.23	0.09	±0.09	12.17	0.000	1 > 2**	ns	1 > 3**
Paranoid ideation	0.86	±0.61	0.47	±0.47	0.25	±0.25	15.33	0.000	1 > 2**	ns	1 > 3**
Psychoticism	0.67	±0.60	0.38	±0.38	0.11	±0.11	17.46	0.000	1 > 2*	2 > 3*	1 > 3**
Severity Index	0.87	±0.61	0.56	±0.47	0.26	±0.26	20.14	0.000	1 > 2*	2 > 3*	1 > 3**

* $P < 0.05$; ** $P < 0.01$.

(hypothesis 1 (H1)). We controlled for depression because alexithymia scores can be influenced by mood.²²

Our hypothesis could be confirmed. CIU patients also scored higher on all alexithymia subscales. Alexithymia and duration of illness (CIU: $r = 0.17$; PSO: $r = 0.28$) showed no significant association.

Second, we hypothesized that CIU patients and psoriasis patients show higher emotional distress, depression and anxiety as measured by the SCL-90-R in comparison with healthy controls (H2).

Hypothesis 2 could also be confirmed. Compared to controls CIU patients and psoriasis patients showed elevated scores with regard to depression, anxiety and emotional distress as measured by the Global Severity Index. Alexithymia sum score was significantly correlated with emotional distress (CIU: $r = 0.45^*$, PSO: $r = 0.42^*$, CO:

$r = 0.57^*$) in both patient groups and in the control group (* $P < 0.05$).

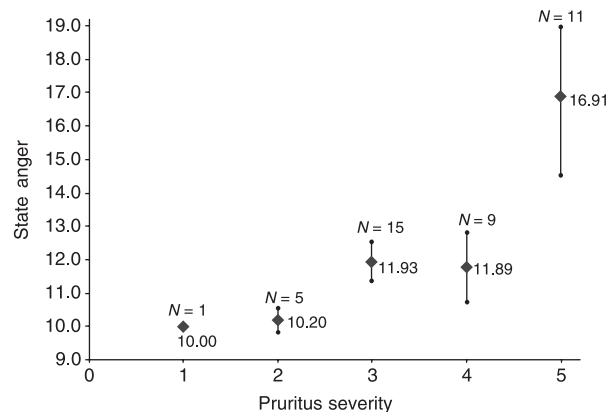
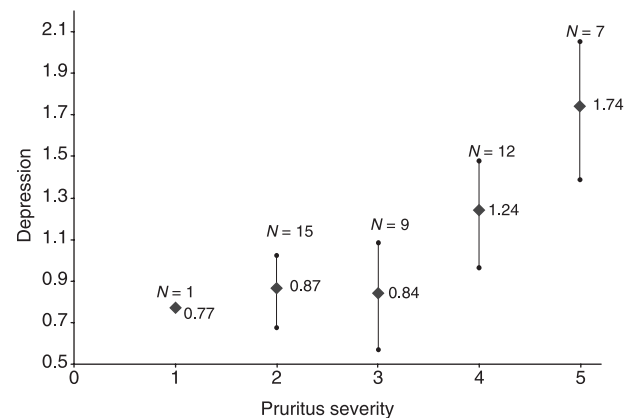
In the next step, we compared the three groups on the STAXI. We hypothesized that CIU patients and psoriasis patients show higher trait anger (H3) and state anger (H4) as measured by the STAXI and that they show difficulties with anger expression in the sense that they either tend to keep their anger in (higher anger-in (H5)) or react overaggressive [higher anger-out (H6)].

Hypotheses 4, 5 and 6 could be confirmed: CIU patients and psoriasis patients showed higher state anger, anger-in and anger-out compared to healthy controls. Hypothesis 3 could not be confirmed. Only psoriasis patients showed significantly higher scores on the subscale trait anger. Correlations between alexithymia sum score and state anger (CIU: $r = 0.35^*$, PSO: $r = 0.21$, CO: $r = 0.01$), trait

Table 5 Results of the State-Trait Anger Inventory (STAXI)

	Group 1		Group 2		Group 3						
	Psoriasis		Urticaria		Control group				Group 1 vs. 2	Group 2 vs. 3	Group 1 vs. 3
	Mean	SD	Mean	SD	Mean	SD	F	P	post hoc comparison	post hoc comparison	post hoc comparison
STAXI-SA	15.43	±5.70	13.00	±4.83	10.80	±1.26	13.58	0.000	1 > 2*	2 > 3*	1 > 3**
STAXI-TA	19.70	±6.30	18.49	±5.30	16.90	±3.77	3.44	0.035	ns	ns	1 > 3*
STAXI-A-I	17.02	±5.14	16.66	±4.58	14.33	±4.08	4.73	0.010	ns	2 > 3*	1 > 3*
STAXI-A-O	13.80	±4.93	13.93	±4.80	11.53	±2.34	4.96	0.008	ns	2 > 3*	1 > 3*
STAXI-A-C	21.36	±5.10	21.98	±5.28	22.35	±4.18	0.48	0.618	ns	ns	ns

* $P < 0.05$; ** $P < 0.01$. STAXI-SA = State Anger; TA = Trait Anger; A-I = Anger-in; A-O = Anger-out; A-C = Anger-control.

**fig. 1** Relationship between pruritus severity and state anger (STAXI) in CIU (mean and standard deviation of mean for state anger is presented).**fig. 2** Relationship between pruritus severity and depression (SCL-90-R) in psoriasis (mean and standard deviation of mean for depression is presented).

anger (CIU: $r = 0.44^*$, PSO: $r = 0.14$, CO: $r = 0.27$) and anger-out (CIU: $r = 0.43^*$, PSO: $r = 0.21$, CO: $r = -0.15$) were only significant ($*P < 0.05$) in CIU patients.

Finally, we hypothesized that a significant part of variance in pruritus perception in CIU (H7) as well as in psoriasis patients (H8) can be explained by negative affect such as anger and/or depression. Thus, we calculated for both skin disorders separate stepwise multiple regression analyses using patient age, gender, skin status, duration of illness, alexithymia sum score, SCL-90-R subscales and STAXI subscales as predictors and pruritus severity as dependent variable. In CIU patients, the regression analysis was significant ($F_{1,39} = 10.1$; $P = 0.003$; adj. $R^2 = 0.19$) and revealed state anger as the only significant predictor (Beta = 0.45; $P < 0.01$) accounting for 19% of variance in pruritus severity. Thus, hypothesis 7 could be confirmed.

Figure 1 shows the relationship between state anger and pruritus severity in CIU patients.

In psoriasis patients, the regression analysis was also significant ($F_{1,42} = 6.7$; $p = 0.013$; adj. $R^2 = 0.12$) and revealed depression as the only significant predictor (Beta = 0.37; $P < 0.01$) accounting for 12% of variance in pruritus severity. Thus, hypothesis 8 could be confirmed.

Figure 2 shows the relationship between depression and pruritus severity in psoriasis patients.

Discussion

Our findings point to difficulties in the identification and communication of emotions in CIU and psoriasis. As we controlled for the influence of depression and as alexithymia scores were not significantly affected by the duration of the skin disorders, our data indicate personality based difficulties in emotional regulation rather than a state-dependent phenomenon. This lack of

emotional awareness may lead to the phenomenon that emotions are primarily experienced in form of bodily symptoms.¹⁰ From a developmental perspective, one might argue that alexithymic individuals show an ontogenetically earlier behavioural-expressive manifestation of affect because the progressive desomatization and differentiation of early affect manifestations as language develops and affects are experienced and communicated consciously by symbolic representations has not taken place.²³ Inner tension and psychophysiological arousal associated with negative affects cannot be reduced efficiently by (verbally) expressing and disclosing inner feelings,^{24,25} and this difficulty can contribute to an increased emotional distress. In accordance with these assumptions in both skin disorders, alexithymia is significantly associated with emotional distress. In CIU, it is also associated with the experience (state anger, trait anger) and expression of anger (anger-out).

In line with our hypotheses in both skin disorders, there was a relationship between pruritus as a major symptom in both disorders and negative affect. Itch was defined more than 300 years ago as an unpleasant sensation that elicits the desire to scratch.²⁶ Taken this still valid definition,²⁷ it seems to be intuitively appealing to ascribe pruritus to emotional factors and to see pruritus as a somatic correlate of anger affect. This might be particularly appealing in CIU as certain characteristics of bodily symptoms associated with anger (sudden onset, redness) show similarities to urticarial reactions. However, to date, the authors are unaware of any study confirming this relationship in CIU. Our study shows a strong correlation between pruritus severity and state anger in CIU, and this emotional state seemed to be the only significant predictor for pruritus severity in this skin disorder, whereas in psoriasis, depression seemed to be the only significant predictor. In a previous study, Gupta *et al.*²⁸ found a direct correlation between depression and pruritus severity in patients with atopic dermatitis, psoriasis and CIU. In accordance with our findings, the authors emphasize that further analysis showed that the relation between pruritus severity and depression in their sample of 32 CIU patients was not as strong as in the other diagnostic groups. However, what could explain the phenomenon that itch in CIU and psoriasis is associated with different emotional states? One might argue that the pruritus in both skin disorders underly different pathophysiological mechanisms. In CIU, itch can be described as pruritoceptive, which means it originates primarily in the skin due to histamine release because of mast cell activation and is transmitted by C nerve fibers.²⁹ Itch in psoriasis is possibly caused by pruritoceptive and neuropathic mechanisms, which means that itch originates in disease located at any point of the afferent pathway.²⁹

Given a higher state anger in CIU compared with controls, we cannot answer the question whether anger is a primary feature of CIU or it is secondary to the skin disorder. Nevertheless, one might ask whether there are any plausible pathophysiological pathways that might explain a close relationship between anger and pruritus perception. We suggest the following pathway. Recent research showed convincingly that corticotropin-releasing hormone (CRH) plays an important role in skin mast cell degranulation.^{30–32} Typically, in situations that anger or frighten us, a fight-flight response to stress is triggered. As part of this response, the reticular activating system stimulates the hypothalamus to release CRH into the bloodstream; as another part, CRH is released from dorsal root ganglia directly in the skin.³⁰ CRH release under stress may be acting together or sequentially with neurotensin to induce skin mast cell activation.³⁰ Thus, anger associated with a CRH-triggered stress response might lead to an increase in mast cell degranulation. In line with this pathophysiological mechanism, Laidlaw *et al.*³³ could show the negative influence of feelings of tension and irritability on wheal size in reaction to histamine. They observed that the majority of subjects in their study were able to decrease the size of the wheals using a cognitive-hypnotic technique. On the whole mood, variables proved to be useful in predicting wheal size change with feelings of irritability and tension being associated with less change in wheal size.

In support of our findings is the clinical observation that drugs that are effective in the management of clinically relevant anger affect or aggression are effective in the management of pruritus in CIU. Thus, the tricyclic antidepressant doxepin that is frequently used for the treatment of aggressive behaviour in elderly and demented patients³⁴ and for the treatment of irritability and restlessness in nicotine withdrawal³⁵ is a potent second-line drug in the treatment of CIU.³⁶ It is important to note that the dosages of doxepin effectively used in CIU are very low and in the sub-therapeutic range for the treatment of major depressive disorder.³⁷ The exact mechanism underlying this efficacy is not known. It is generally attributed to its antihistaminic potency.³⁷ However, doxepin also induces a potent alpha adrenergic receptor blockade,³⁷ which could be of importance with regard to the relationship between anger and pruritus as it may down-regulate sympathetic tone.

With regard to clinical implications, future studies could focus on a possible influence of therapeutic strategies concerning anger management on pruritus perception in CIU. This might be particularly interesting as previous studies could demonstrate a positive influence of (expressed) anger on pain intensity,^{38,39} and there is considerable similarity between brain regions involved in itch

processing and areas involved in pain processing.²⁷ Furthermore, future research could investigate, whether other drugs successful in the treatment of clinically relevant anger and aggression such as atypical antipsychotics,⁴⁰ SSRIs,⁴¹ or beta-adrenergic antagonists⁴⁰ in a lower dosage might also be helpful in the treatment of pruritus and scratching in CIU.

Obviously, our study has certain limitations. First, we investigated relatively small samples of CIU and psoriasis patients, which only facilitates the detection of large differences.

Second, although there was no significant difference between the study groups with regard to gender distribution the percentage of men in the CIU group was far lower compared with the other two study groups (21.9% vs. 45.5% psoriasis and 28.6% control). This difference can partially be explained by the fact that the prevalence of psoriasis is equally high in men and women,⁴² whereas significantly more women are affected by chronic urticaria.⁴³ As men normally score higher on the TAS-20 than women,¹⁰ alexithymia scores probably would have been even higher in a CIU sample with a gender distribution similar to the other groups.

Third, caution should be exercised in drawing conclusion about causality from our cross-sectional study.

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