

## RESEARCH ARTICLE

# Galvanic skin resistance in different phases of menstrual cycle in acne vulgaris

Nitin Pandey, Abdus Salam, Pooja Ojha, Sara Siddiqui, Zeashan Zaidi

Department of Physiology, ERA's Lucknow Medical College, Lucknow, Uttar Pradesh, India

Correspondence to: Nitin Pandey, E-mail: drnitinpandey@gmail.com

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### ABSTRACT


**Background:** Galvanic skin response (GSR) is altered by sympathetic dominance and increased sympathetic activity will cause decrease in GSR. Skin conductance varies with different phases of menstrual cycle. Measuring skin conductance by GSR is safe procedure and utility of this skin conductance is widely used literature. **Aims and Objectives:** Aim of our study was to find association of stress as measured by GSR, in different phases of menstrual cycle in acne vulgaris patients. **Materials and Methods:** 30 cases and 30 age matched controls were recruited. 30 acne cases include 10 each in mild, moderate, and severe acne. GSR was measured using polyrite recording system in different phases of menstrual cycle. **Results:** There was no difference in mean age and standard deviation of case and control group statistically. There was also no statistically significant difference in weight, height, and body mass index in between two groups. In all the three phases, there was a significant difference in GSR values between cases and controls and have higher values in control group. With increasing severity of acne there is worsening of quality of life in case of acne patients and this is also statistically significant. **Conclusion:** Physical and psychosocial stress is contributory in acne severity specially in female acne patients. Hence, timely stress management along with treatment of acne will benefit these patients.

**KEY WORDS:** Acne Vulgaris; Galvanic Skin Resistance; Stress and Body Mass Index

### INTRODUCTION

Acne vulgaris is a pleomorphic condition presenting as both inflammatory (papules, pustules, nodules) and noninflammatory (comedones, open and closed) lesions.<sup>[1]</sup> Grading of acne can be done as mild, moderate, severe, and very severe forms in which mild form can be purely comedonal or mild papulopustular, moderate acne shows numerous comedones, few to many pustules, and few small nodules, with no residual scarring, severe acne shows numerous papulopustules, many nodules, marked

inflammation and scarring is and very severe acne recognized by sinus tracts, grouped comedones, many deeply located nodules, and severe inflammation and scarring. (1) Acne prevalence studied in many studies shows a range from 40% to 80%.<sup>[2,3]</sup> It affects both sexes equally.<sup>[3]</sup> It is more common in adolescent population and cause of depression, mainly in adolescent females and affects quality of life, (2) nowadays female acne is becoming more common.<sup>[4]</sup> Acne severely affects beauty and self-perception. Acne impacts profoundly on the quality of life, on psychosocial development, and on career prospects.<sup>[5]</sup> In female patients, its association with stress, lack of sleep, sweat, and menstruation has been studied in few studies.<sup>[6]</sup> 40% females experience flare of acne near proximity of menstruation.<sup>[6]</sup> Evidence supporting hormonal involvement has been supported by hormonal profile studies and association with polycystic ovarian disease.<sup>[7,8]</sup> Positive correlation of serum testosterone level and acne was found in female patients.<sup>[8]</sup> There is scarcity of literature studying the effect of stress and sweat on flaring of

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acne.<sup>[9]</sup> Galvanic skin response (GSR) is a reliable measure to study the conductance of skin which may be altered by stress and sweat.<sup>[10]</sup> GSR is altered by sympathetic dominance and increased sympathetic activity will cause decrease in GSR. Skin conductance varies with different phases of menstrual cycle.<sup>[11]</sup> Measuring skin conductance by GSR is safe procedure and utility of this skin conductance is widely used literature.<sup>[12,13]</sup>

**MATERIALS AND METHODS**

A total of 30 cases of acne vulgaris and 30 controls were included in the study, from January 2016 to October 2016. Out of which 10 cases presented with mild, 10 cases with moderate, and 10 cases with severe acne according to grading. All the cases were not on any treatment during the study period. 30 age matched healthy volunteer were taken as control group.

Exclusion criteria for case were:

1. Those on treatment of acne vulgaris
2. Obesity
3. Irregular menstrual cycle
4. On hormonal therapy.

Galavanic skin response:

GSR was recorded from Medicaid polyrite system.

Recording was done between 9 AM and 11 AM. Participants were explained about the procedure and written consent was taken. Subject was free to withdraw from the study at any time. Weight, height was measured and BMI was calculated from these values. Female coworker asked their menstrual history and date of last menstrual period. Accordingly, different phases of menstrual cycle were calculated, and subject was given next two dates in which they have to again visit the lab for recording of GSR. They were not allowed to consume coffee, tea, or cola refreshments or any medication on the recording date. Room temperature was maintained at thermoneutral level (22°C-25°C) using air conditioner.

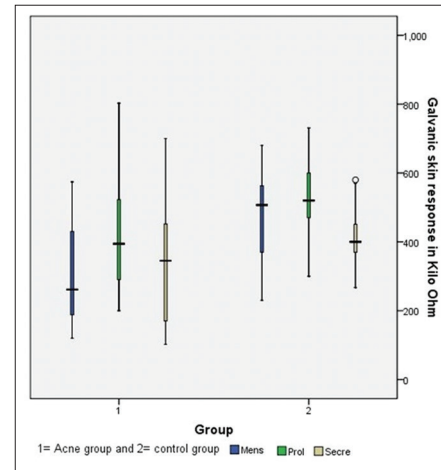
Quality of life questionnaire was given to acne patients and was explained how to fill it. Four question approach as used by Saitta and Grekin was used to assess quality of life in acne patients during different phases of menstrual cycle.<sup>[12]</sup> Data were analyzed using SPSS16 software. Student *t*-test was used for comparison of continuous data. ANOVA test used when there are more than two groups.

**RESULTS**

Results of Table 1 are showing baseline characteristics of case and control group. There was no difference in mean age and standard deviation of case and control group

statistically. There was also no statistically significant difference in weight, height, and body mass index in between two groups.

Results of Table 2 depict values of GSR in menstrual, proliferative, and secretory phases in both groups. In all the three phases, there was significant difference in GSR values between cases and controls and have higher values in control group. Figure 1 is depicting box plot with GSR value in case and control in all the 3 phases of menstrual cycle.



**Figure 1:** Box plot depicting galvanic skin response values in case and control in different phases of menstrual cycle

**Table 1:** Baseline characteristics of case and control group

Characteristics	Group	n	Mean±standard deviation	P-value
Age (years)	Case	30	21.03±3.50	0.409
	Control	30	20.23±3.94	
Height (cm)	Case	30	158.17±4.37	0.072
	Control	30	156.23±3.78	
Weight (kg)	Case	30	56.47±5.93	0.638
	Control	30	57.37±8.56	
BMI (kg/m <sup>2</sup> )	Case	30	22.56±2.12	0.255
	Control	30	23.37±3.19	

BMI: Body mass index

**Table 2:** Comparison of GSR (GSR in kilo ohm) in different menstrual phases

GSR	Group	n	Mean±standard deviation	P-value
Menstrual phase	Case	30	307.07±137.85	<0.001
	Control	30	470.90±119.40	
Proliferative phase	Case	30	414.87±183.79	<0.005
	Control	30	528.93±108.39	
Secretory phase	Case	30	339.40±178.13	<0.035
	Control	30	417.80±88.11	

GSR: Galvanic skin response

**Table 3: QOL with respect to severity of acne**

Acne severity	n	Mean QOL±standard deviation	F	Sig.
1	10	17.80±1.93	38.716	<0.001
2	10	23.20±3.22		
3	10	27.10±1.66		

QOL: Quality of life

Table 3 shows that with increasing severity of acne there is worsening of quality of life in case of acne patients and this is also statistically significant.

## DISCUSSION

Acne vulgaris pathogenesis involves multiple factors. It has been observed that hormonal and stress have role in causation of acne. *Vis-a-vis* acne in young girls may be a reason for their physical and mental stress. Hence, this study was planned to study the role of stress in acne vulgaris or level of stress in acne vulgaris. Hormonal effect was indirectly assessed by measuring stress level by GSR in different phases of menstrual cycle. Furthermore, acne severity was assessed in different phases of menstrual cycle for which we did not found any measure clinical difference in severity. Previous studies found that there is increase in acne severity in premenstrual phase.<sup>[6]</sup>

Results of Table 1 shows baseline characteristics in both groups, in which, we did not find any significant difference. These finding further strengthens our age matching between case and control. Anthropometric measure also was not different in both groups. Most of the studies found correlation between obesity and acne vulgaris.<sup>[14]</sup> We had obesity as exclusion criteria so to exclude on confounding factor.

Table 2 results show that GSR is decreased in all phases of menstrual cycle significantly with that of controls. GSR is affected by stress level and sweat response. It is decreased in sympathetic dominance. Hence, the results could be interpreted as cases have increased sympathetic response which would lead to decreased blood flow and decreased sweat level leading to more GSR. As acne patients have decreased resistance, it is concluded that stress level is contributory factor in acne severity. It may be another way round that acne vulgaris severity aggravates stress level in these patients, which means cause and effect could not be determined by this correlation. We did not found any study of GSR measurement in acne patients.

Table 3 shows the quality of life score in acne patients well correlated with severity of acne. Similar observation was found in a recent Indian study in which psychosocial impact and stress levels were correlated with severity of acne.<sup>[15]</sup>

## CONCLUSION

Physical and psychosocial stress is contributory in acne severity specially in female acne patients. Hence, timely stress management along with treatment of acne will benefit these patients.

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