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Comparative Study of Prolactin Levels in Acne and Non-Acne Individuals among Adolescent

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Abstract **Original Research Article**

***Background*:** One of the most prevalent dermatological conditions affecting adolescents is acne vulgaris. The production of acne vulgaris lesions is a result of hormonal imbalances that impact skin conditions. Prolactin (PRL) is widely known for its involvement in the formation and operation of the mammary glands in addition to its more than three hundred non-lactational activities. ***Objective*:** This study aimed to evaluate and compare prolactin levels in serum hormone between persons with acne vulgaris and those without acne. ***Materials and Methods*:** In this cross-sectional case control study, serum levels of prolactin were collected and estimated in 80 subjects consisting of 40 males and 40 females each; of which 20 were the control group and 20, the test group in each category respectively. Also, certain criteria's were looked into such as subject's age, state of health, menstrual patterns (for females) and much more. Data collected was analyzed using the Software Package for Social Sciences (SPSS). At the end of the experiment, the result showed no significant change ($p<0.05$). ***Result*:** In both male and female adolescents, the mean serum prolactin level of those with acne was higher than that of those without the condition. In adolescents with acne, the mean serum prolactin level was higher (19.48 ± 11.04) than in those without acne (13.48 ± 5.22). P less than 0.05 indicated statistical significance. ***Conclusion*:** An increase in the mean serum prolactin levels of acne subjects in both categories when compared to non-acne subjects indicates the contribution of prolactin in the pathogenesis of acne.

Keywords: Prolactin Levels, acne, non-acne, adolescent.

INTRODUCTION

Acne vulgaris commonly affects adults, adolescents, and preadolescents aged 9 years or older. Acne vulgaris is a chronic, inflammatory skin disease of the pilosebaceous unit.1 Acne primarilypresents with open or closed comedones, papules, pustules, or nodules on the face or trunk and may result in pain, erythema, hyperpigmentation, or scars [1].

Acne vulgaris is one of the most common dermatological diseases in adolescent and adult populations. Puberty is a period when the first symptoms of acne often appear. The first acne lesions, like comedones, papules, pustules, or nodules, occur at the age of 11–12 and affect 85% of adolescents [2].

Hormonal imbalance in both adolescent and adult people affects the skin condition and results in the formation of acne vulgaris lesions, which are associated with abnormalities of sebaceous glands. These glands are closely linked to hormonal biosynthesis. The conversion of 17-hydroxyprogesterone straight to dihydrotestosterone with the avoidance of testosterone has been demonstrated. What is more, in sebaceous glands both testosterone and dihydrotestosterone are inactivated by 17B-hydroxysteroid dehydrogenase [3, 4]. Androgens regulate the synthesis of sebum and influence inflammatory processes in sebaceous glands affected by acne vulgaris [4].

Prolactin (PRL) is well recognized for its role(s) in mammary gland development and function as well as over three hundred non-lactationalfunctions.5However, androgens have a main role in acne pathogenesis and the interaction between prolactin and androgens generate the hypothesis of prolactin role in acne pathogenesis [5].

Prolactin (PRL) is a peptide hormone produced by the pituitary gland and diverse extra pituitary sites, which triggers activation of various signaling pathways after binding to its prolactin receptor (PRLr) resulting in the activation of specific genes associated with the pleiotropic activities of PLR [6]. Prolactin (PRL), also known as luteotropic hormone or luteotropin or lactotrope is a protein that in humans is best known for its role in enabling female mammals to produce milk [7].

Also has it been recorded, of prolactin having over three hundred (300) nonlactational functions such as acting in acts in a cytokine-like manner and as an important regulator of the immune system, cell cycle related functions as a growth-, differentiating- and anti-apoptotic factor. As a growth factor, involved in the regulation of blood clotting through several pathways and more [8].

Despite technological advances and an increased degree of sophistication within experimental dermatology, the precise mechanisms of the acne process remain elusive. Many young people especially the adolescents were seen been so curious to find out if the difference in hormonal levels in individual were the main cause of acne vulgaris. Androgens, microbes and other pathogenetic influences are also at work in the development of acne. Therefore a difference should exist in the prolactin hormone levels of acne individuals in comparison with non-acne individuals. The aim of this study was to make assessment and comparison of serum hormonal levels of prolactin in acne vulgaris individuals and non-acne individuals among adolescent.

MATERIALS AND METHODS

The study is case control study aimed at assessment and comparison of serum hormonal levels of prolactin in acnevulgaris individuals and non-acne individuals. A number of eighty (80) subjects were used in this study; of which forty (40) were males and forty (40) were female srespectively aged between 10 and 19.

This study is a cross-sectional case-control one that was conducted on two groups. Subjects in each category (male and female) were dived into two groups respectively; the control group consisting of individuals without acne and the case group consisting of individuals with having acne respectively.

This study was carried out during the period of January 2024 to July2024 in the department of Dermatology & Venereology, International Medical College Hospital, Gazipur and Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka. Among 80 subjects were selected, of which were grouped into 40 males and 40 females. In each of the category of male and female, it was further grouped into control groups of twenty (20) subjects and case group of twenty (20) subjects respectively. The criteria of which subjects were selected as follows: age range of 10-19 years, control group were individuals whoseskin were void of acne and have no previous case orexperience of acne. Subjects under case group were individuals with mild, moderate and severe acne. Menstrual patterns of female subjects. Patients were individuals who were sick or under any type of medications, obese individuals, pregnancy and lactation, females in their menstrual periods, smoking were excluded in this study. Questionnaires were used to collect data of subjects'suchas; age, state of health, medications, menstrual patterns (females). Blood samples of about 3- 4 milliliters were collected from subjects through venous puncture by means of syringes (5ml syringe) and dispensed into plain red-top tubeblood sample containers, for collection of serum. The hormonal assay was done using the prolactin ELISA kit (CALBIOTECH Company) and with the ELISA machine. Hormonal analysis was carried out immediately after the samples collection.

Principle of the Prolactin ELISA Test

The prolactin quantitative test is based on a solid phases and wich ELISA assay method, based on a streptavidin-biotinprinciple. The standards, samples and a reagentmixture of Anti-prolactin Enzyme and Biotin conjugates are added into the wells coated with Streptavidin. Prolactin in the subject's serum forms a sandwich between two highly specific Prolactin antibodies labeled with Biotin and HRP. Simultaneously, the biotinylated antibody is immobilizedonto the well through a high affinity Streptavidin-Biotininteraction. Unbound protein and excess biotin/enzymeconjugated reagent are washed off by wash buffer. Upon the addition of substrate, the intensity of colour developed is directly proportional to the concentration of Prolactin in the samples. A standard curve is prepared relating colour intensity to the concentration of the Prolactin. The results were collected, tabulated as Mean ± SD the data were analyzed with T-test analysis using the statistical package for social sciences, version 25.0. The differences were considered significant at $p<0.05$.

RESULTS

In adolescents with acne, the mean age was 14.13 (±2.26), while in those without acne, it was 14.95 (±2.20). Concerning the equal male and female (Table-1). Among 40 acne cases, It was mild in 26 (65%) patients followed by moderate in 11 (27.5%) and severe in 3 (7.5%) patients (Table-2). Male adolescents with acne had a higher mean serum prolactin level (13.80 ± 3.05) compared to non-acne individuals (9.70 ± 3.57). The result was statistically significant ($p<0.05$) (Table-3). The mean serum prolactin level of acne subjects 25.15(±13.16) was elevated compared to non-acne subjects 17.25(±3.65) in female adolescent. That was statistically significant ($p<0.05$) (Table-4). In adolescents, acne subjects had a higher mean serum prolactin level of 19.48 (±11.04) compared to non-acne subjects of 13.48 (±5.22). This was statistically

significant ($p < 0.05$) (Table-5). In adolescents, female acne patients had a higher mean serum prolactin level (21.20(±10.34)) than male patients (12.93(±4.68)). The result was statistically significant ($p<0.05$) (Table-6).

Table 1: Demographic characteristics of the study population

Demographic characteristics	Acne n=40	Non Acne n=40	p value
Age in years	14.13(±2.26)	14.95(±2.20)	0.10
Sex			
Male	20 (50%)	20 (50%)	1.0
Female	20 (50%)	20(50%)	

Table 2: Severity of Acne of the study group (n=40)

Severity of Acne	Number	Percentage
Mild	26	65
Moderate	11	27.5
Severe	3	7.5
Total	40	100

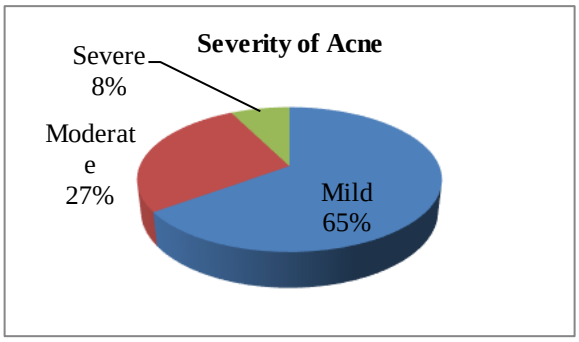

Table 3: Mean comparison of serum Prolactin level between Acne and non-Acne group in male adolescent

	Male		P value
	Acne n=20	Non Acne n=20	
Prolactin serum level	13.80(±3.05)	9.70(±3.57)	<0.001

Table 4: Mean comparison of serum Prolactin level between Acne and non-Acne group in female adolescent

	Female		P value
	Acne n=20	Non Acne n=20	
Prolactin serum level	25.15(±13.16)	17.25(±3.65)	<0.001

Table 5: Mean comparison of serum Prolactin level between Acne and non-Acne group in adolescent

	Study group		P value
	Acne n=40	Non Acne n=40	
Prolactin serum level	19.48(±11.04)	13.48(±5.22)	<0.001

Table 6: Mean comparison of serum Prolactin level between male and female adolescent

	Study group		P value
	Male n=40	Female n=40	
Prolactin serum level	12.93(±4.68)	21.20(±10.34)	<0.001

DISCUSSION

Prolactin works synergistically with growth hormone, melatonin and leptin. All of these hormones are pro-inflammatory because they stimulate the immune system and are higher during sleep, especially slow wave sleep. While you sleep, cortisol and catecholamines decrease and have an anti-inflammatory effect by

inhibiting immune function. This creates a very pro-inflammatory environment during slow wave sleep. Prolactin is quite pro-inflammatory since it increases immunological activation and the generation of various pro-inflammatory cytokines via its cytokine-like effect, contributing to acne's distinctive feature. Prolactin has been linked to some autoimmune illnesses, which is consistent with its pro-inflammatory properties. Prolactin levels are elevated throughout the active phase of various autoimmune disorders, even before symptoms manifest.

This study found that the average age of adolescent acne was 14.13 (±2.26), while non-acne was 14.95 (±2.20). Male-female pairs had a mean BMI of 24.1±3.52 for adolescent acne and 23.7±2.59 for non-acne. Dhaher *et al*., [9] found that 47 percent of 160 patients with adolescent acne (AA) had a mean age of 17.2 ± 1.6 years. Dhaher *et al*., others viewed the onset of AA as ranging from 12-19 years and PA is typically started beyond the age of 20 years [10].

The current study found that out of 40 acne instances, 26 (65%) were mild, 11 (27.5%) were moderate, and three (7.5%) were severe. According to Khunger and Kumar's study, mild cases were observed in 149 (69.6%), moderate cases in 60 (28.1%), and severe cases in 5 (2.3%) [11]. A study found that male adolescents with acne had a higher mean serum prolactin level (13.80 ± 3.05) compared to non-acne individuals (9.70 ± 3.57). The result was statistically significant ($p<0.05$). Chukwu *et al*., [5] revealed that when the males acne (12.26±1.50) were compare to the males non-acne (8.80±1.03) there was a non-statistically significant difference ($p>0.05$).

In this study, it was shown that the mean serum prolactin level in female adolescents with acne was higher—25.15(±13.16)—than in those without acne (17.25±3.65). P less than 0.05 indicated statistical significance. Chukwu *et al*., [5] observed a similar thing: their mean serum prolactin level (22.04±4.59) was higher in acne participants than in non-acne subjects (12.92±1.62).

The current study found that adolescents with acne had mean serum prolactin levels of 19.48(±11.04) against 13.48(±5.22) for non-acne participants. P less than 0.05 indicated statistical significance. According to Szybiak *et al*., [2] the study group's mean ±SD prolactin serum levels (16.73±8.02 ng/ml) were statistically greater than those of the control group (13.74 ±8.71 ng/ml). Chukwu and colleagues found that the average serum prolactin levels of acne cases were considerably higher in males (12.26 ± 1.50) compared to male control (8.80 ± 1.03) and females (22.04 ± 4.59) compared to female control (12.92 ± 1.62) cases [5]. In the study by Akdogan *et al*., the prolactin serum level was higher in patients with acne than in the control group, but this result was not statistically significant [12]. The study by Meena *et al*., [13] revealed an elevated prolactin serum level in 2 out of 60 acne patients (3.3%). Moreover, 6.7% of patients presented a raised total testosterone level [13]. In the study by Dhaher *et al*., in up to 32% of patients with acne, the measured prolactin serum level was above the normal range [9]. Previous results are consistent with our study – statistical analysis also revealed a significant difference in prolactin serum levels between acne patients and healthy controls. The mean ± SD was higher in patients suffering from acne vulgaris than in the controls. However, in the study conducted by Khunger *et al*., [11] none of the 280 acne patients presented an elevated level of prolactin serum.

CONCLUSION

According to the trial, prolactin levels were higher in people with acne than in people without acne, with hyperprolactinemia being the primary cause of prolactin levels in the majority of acne sufferers.

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