w.jaypeebrothers.com, for detailed information on dermatology books, visit our website www.jaypeebrothers.com

Celebrating 50 YEARS
Passion, Quality and Innovation in Healthcare Publishing

Year Book of Dermatology – 2019

ACNE

Editors
Shashi Kumar BM
Savitha AS
R Raghunatha Reddy

Foreword
Ramesh Bhat M

JAYPEE

CONTENTS

1. Treatment of Moderate Acne Vulgaris in Fitzpatrick Skin Type V or VI: Efficacy and Tolerability of Fixed Combination Clindamycin Phosphate 1.2%/Benzoyl Peroxide 3.75% Gel 1
2. Novel Tretinoin 0.05% Lotion for the Once-daily Treatment of Moderate-to-severe Acne Vulgaris: Assessment of Efficacy and Safety in Patients aged 9 Years and Older 2
3. Once-daily Oral Sarecycline 1.5 mg/kg/day is Effective for Moderate-to-severe Acne Vulgaris: Results from Two Identically Designed, Phase 3, Randomized, Double-blind Clinical Trials 3
4. The Efficacy and Safety of Azelaic Acid 15% Foam in the Treatment of Facial Acne Vulgaris 4
5. Frequency of Treatment Switching for Spironolactone Compared to Oral Tetracycline-class Antibiotics for Women with Acne: A Retrospective Cohort Study 2010–2016 5
6. Clinical Experience with Once-daily Dapsone Gel, 7.5% Monotherapy in Patients with Acne Vulgaris 7
7. An Acne Survey from the World's Largest Annual Gathering of Twins 8
8. Efficacy and Safety of Adapalene 0.3%/Benzoyl Peroxide 2.5% Gel plus Oral Doxycycline in Subjects with Severe Inflammatory Acne who are Candidates for Oral Isotretinoin 9
9. Efficacy, Safety and Tolerability of Topical Dapsone Gel, 7.5% for Treatment of Acne Vulgaris by Fitzpatrick Skin Phototype 10
10. Clinical Significance of Neutrophil Gelatinase-associated Lipocalin and Galectin-7 in Tape-stripped Stratum Corneum of Acne Vulgaris 11
11. Risk of Depression among Patients with Acne: A Population-based Cohort Study using The Health Improvement Network (THIN) Database 12
12. Acne Development in Male Androgenetic Alopecia 13
13. Effects of Isotretinoin Treatment on Affective and Cognitive Functions in Adolescent Acne Vulgaris Patients 14
14. Analysis of Gut Microbiome in Patients with Acne Vulgaris 15
15. Isotretinoin Therapy: A Retrospective Cohort Analysis of Completion Rates and Factors Associated with Nonadherence 16

16. Photodynamic Therapy for Acne Conglobata of the Buttocks: Effective Anti-inflammatory Treatment with Good Cosmetic Outcome 17

17. Acneiform Eruptions: An Unusual Dermatological Side Effect of Ribavirin 18

18. Topical Dapsone Gel is a New Treatment Option for Acne Agminata 19

19. The Effect of Continuous High versus Low Dose Oral Isotretinoin Regimens on Dermcidin Expression in Patients with Moderate-to-severe Acne Vulgaris 20

20. Transgender Adolescents and Acne: A Case Series 21

21. Chemical Peels in the Treatment of Acne: Patient Selection and Perspectives 22

22. A Novel Cognitive Stress Management Technique for Acne Vulgaris: A Short Report of a Pilot Experimental Study 24

23. Evaluation of the Efficacy of Microneedle Fractional Radiofrequency in Turkish Patients with Atrophic Facial Acne Scars 25

24. Effect of Oral Isotretinoin on the Nucleocytoplasmic Distribution of FoxO1 and FoxO3 Proteins in Sebaceous Glands of Patients with Acne Vulgaris 27

25. Adult-onset Acne: Prevalence, Impact and Management Challenges 29

26. Acne: A Side Effect of Masculinizing Hormonal Therapy in Transgender Patients 31

27. Efficacy and Safety Profile of Spironolactone 50 mg v/s Isotretinoin 10 mg in the Treatment of Female Patients with Acne Vulgaris Grade 1-2—A Double Blinded, Randomized Comparative Study 32

28. The Microbiome in Preadolescent Acne: Assessment and Prospective Analysis of the Influence of Benzoyl Peroxide 34

29. Association of Systemic Antibiotic Treatment of Acne with Skin Microbiota Characteristics 35

30. Novel Nicotinamide Skin-adhesive Hot Melt Extrudates for Treatment of Acne 36

31. Treatment of Acne with a Combination of Propolis, Tea Tree Oil and *Aloe vera* Compared to Erythromycin Cream: Two Double-blind Investigations 38

32. The Safety and Efficacy of Four Different Fixed Combination Regimens of Adapalene 0.1%/Benzoyl Peroxide 2.5% Gel for the Treatment of Acne Vulgaris: Results from a Randomized Controlled Study 39

33. Survey of Acne-related Post-inflammatory Hyperpigmentation in the Middle East 41

34. The Use of Hormonal Antiandrogen Therapy in Female Patients with Acne: A 10-year Retrospective Study 42

35. Adapalene 0.3% Gel Shows Efficacy for the Treatment of Atrophic Acne Scars 43

36. Evaluation the Efficacy of Trichloroacetic Acid 33% in Treatment of Oral Retinoid-induced Cheilitis Compared with Placebo (Vaseline): A Randomized Pilot Study 45

37. Light Therapies for Acne: Abridged Cochrane Systematic Review including GRADE Assessments 46

38. Dapsone-loaded Invasomes as a Potential Treatment of Acne: Preparation, Characterization and In Vivo Skin Deposition Assay 48

39. Prevention and Reduction of Atrophic Acne Scars with Adapalene 0.3%/Benzoyl Peroxide 2.5% Gel in Subjects with Moderate or Severe Facial Acne: Results of a 6-month Randomized, Vehicle-controlled Trial using Intra-individual Comparison 49

40. Complementary and Alternative Methods for Treatment of Acne Vulgaris: A Systematic Review 50

41. Effects of the Myrtle Essential Oil on the Acne Skin—Clinical Trials for Korean Women 52

42. Comparison of Efficacy of Commercially Available versus Freshly Prepared Salicylic Acid Peel in Treatment of Acne: A Randomized Open-label Study 53

43. A Comparison of Combined Oral Contraceptives Containing Chlormadinone Acetate versus Drospirenone for the Treatment of Acne and Dysmenorrhea: A Randomized Trial 54

44. Efficacy and Adverse Events of Oral Isotretinoin for Acne: A Systematic Review 56

45. Aromatherapy, Botanicals, and Essential Oils in Acne 58

46. A Review of Diagnosis and Treatment of Acne in Adult Female Patients 59

47. Clinical Evidence for Washing and Cleansers in Acne Vulgaris: A Systematic Review 60

48. ROS-responsive Microneedle Patch for Acne Vulgaris Treatment 62

49. Optimizing the Use of Topical Retinoids in Asian Acne Patients 63

50. Comparative Study of the Efficacy of Platelet-rich Plasma Combined with Carboxytherapy versus its Use with Fractional Carbon Dioxide Laser in Atrophic Acne Scars 64

51. Effects of Oral Supplementation with FOS and GOS Prebiotics in Women with Adult Acne: The "SO Sweet" Study: A Proof-of-concept Pilot Trial 66

52. Approaches to Limit Systemic Antibiotic Use in Acne: Systemic Alternatives, Emerging Topical Therapies, Dietary Modification, and Laser and Light-based Treatments 67

53. The Efficacy and Tolerability of 5-aminolevulinic Acid 5% Thermosetting Gel Photodynamic Therapy in the Treatment of Mild-to-moderate Acne Vulgaris. A Two-center, Prospective Assessor-blinded, Proof-of-concept Study 69

54. Combination Chemical Peels are More Effective than Single Chemical Peel in Treatment of Mild-to-moderate Acne Vulgaris: A Split Face Comparative Clinical Trial 70

55. Comparison of Efficacy of Aminolevulinic Acid Photodynamic Therapy versus Adapalene Gel plus Oral Doxycycline for Treatment of Moderate Acne Vulgaris – A Simple, Blind, Randomized, and Controlled Trial 72

56. Microneedling by Dermapen and Glycolic Acid Peel for the Treatment of Acne Scars: Comparative Study 73

57. Antipruritic Efficacies of Doxycycline and Erythromycin in the Treatment of Acne Vulgaris: A Randomized Single-blinded Pilot Study 75

58. Does Isotretinoin Cause Depression and Anxiety in Acne Patients? 76

59. Treatment of Atrophic Acne Scarring with Fractional Micro-plasma Radiofrequency in Chinese Patients: A Prospective Study 78

60. Comparison of Novel Dual Mode versus Conventional Single Pass of a 1450-nm Diode Laser in the Treatment of Acne Vulgaris for Korean Patients: A 20-week Prospective, Randomized, Split-face Study 80

61. Resurfacing of Facial Acne Scars with a New Variable-pulsed Er:YAG Laser in Fitzpatrick Skin Types IV and V 82

62. A Novel Topical Minocycline Foam for the Treatment of Moderate-to-severe Acne Vulgaris: Results of 2 Randomized, Double-blind, Phase 3 Studies 83

63. Management of Comedonal Acne Vulgaris with Fixed-combination Topical Therapy 85

64. Blunt Cannula Subcision is more Effective than Nokor Needle Subcision for Acne Scars Treatment 86

65. Novel Tretinoin 0.05% Lotion for the Once-daily Treatment of Moderate-to-severe Acne Vulgaris in a Preadolescent Population 88

66. Efficacy of Two Plant Extracts Against Acne Vulgaris: Initial Results of Microbiological Tests and Cell Culture Studies 90

67. Female Type of Adult Acne: Physiological and Psychological Considerations and Management 91

68. The Efficacy and Safety of Nonpharmacological Therapies for the Treatment of Acne Vulgaris: A Systematic Review and Best-evidence Synthesis 94

69. Clindamycin Phosphate 1.2%/Benzoyl Peroxide 3% Fixed-dose Combination Gel versus Topical Combination Therapy of Adapalene 0.1% Gel and Clindamycin Phosphate 1.2% Gel in the Treatment of Acne Vulgaris in Japanese Patients: A Multicenter, Randomized, Investigator-blind, Parallel-group Study 96

70. Screening of Body Dysmorphic Disorder in Acne Patients: A Pilot Study 97

71. A Qualitative Investigation of the Impact of Acne on Health-related Quality of Life: Development of a Conceptual Model 99

72. Host-microbiome Interactions and Recent Progress into Understanding the Biology of Acne Vulgaris 100

73. Acne in Lomé, Togo: Clinical Aspects and Quality of Life of Patients 102

74. The Role of the Physician in Patient Perceptions of Barriers to Primary Adherence with Acne Medications 103

75. Exploring the Relationship between Stress and Acne: A Medical Student's Perspective 105

76. The Impact of Acne and Facial Postinflammatory Hyperpigmentation on Quality of Life and Self-esteem of Newly Admitted Nigerian Undergraduates 106

77. Which Acne Treatment has the Best Influence on Health-related Quality of Life? Literature Review by the European Academy of Dermatology and Venereology Task Force on Quality of Life and Patient Oriented Outcomes 107

78. Stressful Life Events and Psychiatric Comorbidity in Acne–A Case Control Study 109

79. The Evaluation of Psychiatric Comorbidity, Self-injurious Behavior, Suicide Probability, and other Associated Psychiatric Factors (Loneliness, Self-esteem, Life Satisfaction) in Adolescents with Acne: A Clinical Pilot Study 111

80. Acne Relapses: Impact on Quality of Life and Productivity 112

81. The Mental Health Burden in Acne Vulgaris and Rosacea: An Analysis of the US National Inpatient Sample 113

82. The Therapeutic Effect of Tanshinone IIA on *Propionibacterium acnes*-induced Inflammation In Vitro 115

83. Anti-acne Properties of Hydrophobic Fraction of Red Ginseng (Panax Ginseng C.A. Meyer) and its Active Components 116

84. Mechanistic Insight into the Activity of a Sulfone Compound Dapsone on *Propionibacterium* (Newly Reclassified as *Cutibacterium*) *Acnes*–mediated Cytokine Production 118

85. Lipidomics Reveals Skin Surface Lipid Abnormity in Male Youth Acne 120

86. Acne Vulgaris Severity Graded by In Vivo Reflectance Confocal Microscopy and Optical Coherence Tomography 121

87. Vitamin D Levels in Acne Vulgaris Patients Treated with Oral Isotretinoin 124

88. The Effect of Milk Consumption on Acne: A Meta-analysis of Observational Studies 125

89. Acne and Nutrition: Hypotheses, Myths and Facts 127

90. Enhancement of Lipid Content and Inflammatory Cytokine Secretion in SZ95 Sebocytes by Palmitic Acid Suggests a Potential Link between Free Fatty Acids and Acne Aggravation 129

91. Characterization of *Cutibacterium acnes* Phylotypes in Acne and In Vivo Exploratory Evaluation of Myrtacine 130

92. Atrophic Scar Formation in Acne Patients involves Long-acting Immune Responses with Plasma Cells and Alteration of Sebaceous Gland 132

93. Lesional and Circulating Levels of Interleukin-17 and 25 Hydroxy-cholecalciferol in Active Acne Vulgaris: Correlation to Disease Severity 134

94. Clinical Efficacy of 0.5% Topical Mangosteen Extract in Nanoparticle Loaded Gel in Treatment of Mild-to-moderate Acne Vulgaris: A 12-Week, Split-Face, Double-blinded, Randomized, Controlled Trial 136

95. The Influence of Exposome on Acne 138

96. Association of Interleukin-6 Gene Promoter Polymorphism with Acne Vulgaris and its Severity 139

97. Genome-wide Meta-analysis Implicates Mediators of Hair Follicle Development and Morphogenesis in Risk for Severe Acne 141

98. Microbiological Profile of Sarecycline: A Novel Targeted Spectrum Tetracycline for the Treatment of Acne Vulgaris 143

99. Daily Intake of Soft Drinks and Moderate-to-severe Acne Vulgaris in Chinese Adolescents 144

100. New Concepts, Concerns, and Creations in Acne 146

101. The Anti-inflammatory Activities of *Propionibacterium acnes* CAMP Factor-targeted Acne Vaccines 148

102. Skin Ecology during Sebaceous Drought—How Skin Microbes Respond to Isotretinoin 149

103. *Propionibacterium acnes*-derived Extracellular Vesicles Promote Acne-like Phenotypes in Human Epidermis 150

104. Patients with Acne Vulgaris have a Distinct Gut Microbiota in Comparison with Healthy Controls 152

105. Inhibitory Effects of *Euphorbia supina* on *Propionibacterium acnes*-induced Skin Inflammation In Vitro and In Vivo 153

106. Isolation and Identification of the Follicular Microbiome: Implications for Acne Research 154

107. Expression of Inflammatory and Fibrogenetic Markers in Acne Hypertrophic Scar Formation: Focusing on Role of TGF-β and IGF-1R 156

108. Decrease in Diversity of *Propionibacterium acnes* Phylotypes in Patients with Severe Acne on the Back 158

109. Short Lipopeptides Specifically Inhibit the Growth of *Propionibacterium acnes* with Antibacterial and Anti-inflammatory Dual Action 159

110. Plasma Exeresis for Active Acne Vulgaris: Clinical and In Vivo Microscopic Documentation of Treatment Efficacy by Means of Reflectance Confocal Microscopy 161

111. Licochalcone A Attenuates Acne Symptoms Mediated by Suppression of NLRP3 Inflammasome 162

112. Gut Microbiota Alterations in Moderate-to-severe Acne Vulgaris Patients 163

113. Overall and Subgroup Prevalence of Acne Vulgaris among Patients with Hidradenitis Suppurativa 164

114. Association of the TNF-α Gene Promoter Polymorphisms at Nucleotide-238 and -308 with Acne Susceptibility: A Meta-analysis 166

115. Tumor Necrosis Factor α-308 G/A and Interleukin 1 β-511 C/T Gene Polymorphisms in Patients with Scarring Acne 167

116. SIG1459: A Novel Phytyl-Cysteine Derived TLR2 Modulator with In Vitro and Clinical Anti-acne Activity 169

117. Associations among Two Vitamin D Receptor (VDR) Gene Polymorphisms (ApaI and TaqI) in Acne Vulgaris: A Pilot Susceptibility Study 170

118. Using Network Oriented Research Assistant (NORA) Technology to Compare Digital Photographic with In-Person Assessment of Acne Vulgaris 172

119. Genetic Association between the *NLRP3* Gene and Acne Vulgaris in a Chinese Population 173

120. Serum Irisin: A Prognostic Marker for Severe Acne Vulgaris 175

121. Primary Sebocytes and Sebaceous Gland Cell Lines for Studying Sebaceous Lipogenesis and Sebaceous Gland Diseases 178

122. Acne Vulgaris in Patients with Hidradenitis Suppurativa 180

123. Validation of 3D Skin Imaging for Objective Repeatable Quantification of Severity of Atrophic Acne Scarring 181

124. No Evidence for Follicular Keratinocyte Hyperproliferation in Acne Lesions as Compared to Autologous Healthy Hair Follicles 183

125. Seasonal Changes in Epidermal Ceramides are Linked to Impaired Barrier Function in Acne Patients 185

126. *Cutibacterium acnes* (*Propionibacterium acnes*) and Acne Vulgaris: A Brief Look at the Latest Updates 187

127. The In Vitro Antimicrobial Evaluation of Commercial Essential Oils and their Combinations against Acne 189

128. Seasonal Aggravation of Acne in Summers and the Effect of Temperature and Humidity in a Study in a Tropical Setting 192

129. Acne Prevalence in 9–14-year-old Patients Attending Pediatric Ambulatory Clinics in Italy 194

130. Confocal Microscopy in Adult Women with Acne 196

131. Erythema-directed Digital Photography for the Enhanced Evaluation of Topical Treatments for Acne Vulgaris 198

132. Acne Vulgaris: The Metabolic Syndrome of the Pilosebaceous Follicle 200

133. Circular RNA Expression Profile Analysis of Severe Acne by RNA-Seq and Bioinformatics 202

134. Taxonomy and Phylogeny of *Cutibacterium* (formerly *Propionibacterium*) *acnes* in Inflammatory Skin Diseases 204

135. Transforming Acne Care by Pediatricians: An Interventional Cohort Study 205

Index ***207***

ARTICLE 128

Seasonal Aggravation of Acne in Summers and the Effect of Temperature and Humidity in a Study in a Tropical Setting

Narang I, Sardana K, Bajpai R, et al. Seasonal aggravation of acne in summers and the effect of temperature and humidity in a study in a tropical setting.
J Cosmet Dermatol. 2018.

Abstract

Acne and acne flares have been influenced by high temperature and humidity in tropical areas. When patients with acne were questioned about aggravation, improvement, or no change in their acne with respect to the seasons, it was found that 47.95% of the patients had seasonal variation of acne. Summer aggravation was statistically significant. Temperature and humidity have a role in pathogenesis of acne and acne flare. In this study, it was found that the aggravation of acne was more in summer and rainy season.

COMMENT

Western literature is of the consensus that summer season and ultraviolet radiation benefit acne, although a study from India has found the opposite to be true. This was a cross-sectional study for a period of 1 year in a tertiary care hospital in Delhi conducted on acne patients seeking treatment for acne.

A total of 216 patients out of 387 were on irregular or inappropriate treatment or on topical or systemic treatment, which could aggravate acne. Thus, 171 patients with acne vulgaris (87 males and 84 females) between age group of 12 years and 32 years, with a minimal duration of acne for 1 year, were evaluated. Patients on monthly regular follow-up were evaluated for variation in acne severity, whereas in the rest, a question-based assessment was carried out. Patients had duration of acne ranging for 1–20 years. The comprehensive acne severity system was used to grade acne as almost clear, mild, moderate, severe, and very severe. Based on the climate in Delhi, the seasons were categorized as summer (April to June), rainy (July to September), winter (November to February), spring (March), and autumn (October). Aggravation, improvement or no change in acne with the seasons was recorded on questioning the patients. The improvement or worsening was graded as 1 (mild, <25%), 2 (moderate, 25–50%), 3 (severe, 50–75%), and 4 (very severe), and the specific season of this variation was noted. The mean temperature was 32.2°C, 31°C, and 15°C in summer, rainy, and winters, respectively. The mean humidity was 49.2%, 68.5%, and 79.7% in summer, rainy, and winters, respectively.

About 47.95% of the patients reported seasonal variation of acne, 40.4% of patients reported aggravation in summer of which 54.89% of patients had aggravation in summer only. The aggravation in winter and

JAYPEE BROTHERS

rainy season was seen in 6.42% and 1.16% of patients, respectively. The aggravation in summers and improvement in winter was seen in 4.09% of cases, whereas another 4.09% had aggravation both in summer and rainy. Patients did not show any seasonal change in spring and autumn. The aggravation in summer was statistically significant compared to rainy and winter, the comparison between rainy and winter was not statistically significant. This is consistent with studies from India, whereas western literature suggests that fewer patients seek treatment for acne in summer months. However, a study from Munich found that one-third of the patients (46 of 139) reported aggravation of acne in summer, another one-third had improvement in winter (44/139), and the other third did not notice any seasonal change (46/139).

Clinical observations suggest that acne worsens on exposure to tropical and subtropical climates. The effect of ambient temperature and humidity were assessed by ruling out the history of usage of comedogenic agents, treatment taken for acne, and medications used, which could have aggravated acne. A higher mean temperature in summer had a flare in acne, as sebum excretion rate is directly proportional to change in local temperature; 1°C change in temperature produced a change in the sebum excretion in the order of 10%. Another contributory factor for flare in summer could possibly be ultraviolet A (UVA) light from the observation that photochemotherapy (PUVA) treatment can cause perioral dermatitis and acneiform eruption. On exposure to UVA, squalene gets converted to squalene monohydroperoxide, and this appears to be responsible for comedogenicity. The surface lipid had less squalene when forehead temperature was decreased, whereas no variations in the other components of the surface lipid were observed. Lower lipid production in winter was observed in another study corresponding to the observation in the present study.

Tropical acne was seen in troops during the Second World War who were posted in the Far East, which was similar to ambient high humidity in Delhi. The poral occlusive effect of skin in humid environment and friction irritating the upper parts of pilosebaceous duct may also contribute to acne. The improvement in acne during summers seen in this study may not be true for all geographical locations. The flare in acne in tropical conditions may be an effect of variation in temperatures and high humidity. If a flare is anticipated then therapy can be regulated, and also the effect of change in the temperature and humidity on acne influences the results of the trials with both topical and systemic agents for treating acne.

Key Messages

- ***Temperature and humidity both have a role in the pathogenesis of acne and are responsible for acne flare***
- ***In this study, aggravation of acne was more in summer and rainy seasons.***

JAYPEE BROTHERS

ARTICLE 129

Acne Prevalence in 9–14-year-old Patients Attending Pediatric Ambulatory Clinics in Italy

Napolitano M, Ruggiero G, Monfrecola G, et al. Acne prevalence in 9 to 14-year-old patients attending pediatric ambulatory clinics in Italy.
Int J Dermatol. 2018;57(11):1320-3.

Abstract

In the present-day scenario, a higher proportion of patients with younger onset of acne vulgaris are commonly seen than in the past. When a total of 683, 9–14-year-old, patients attending 32 different ambulatory clinics in Italy were analyzed, it was found that acne was present in 34.3% of the patients. About 88.5% of patients suffering from acne had mild disease state severity. Around 1.7% of patients had severe or very severe forms of acne.

COMMENT

Acne vulgaris is a chronic inflammatory disease of the pilosebaceous follicles affecting patients of all ages. Adolescents and adults, aged 12–24 years, are the most commonly affected with a prevalence of 70–80%. However, recent literature shows that younger age of onset is common, with an increasing earlier age of onset in childhood between 1 year and 8 years of age. Childhood acne is now considered as a normal variant of acne not requiring endocrinological evaluation as against the earlier belief.

Various factors, including hormones, body mass index (BMI), and diet, may contribute to the pathogenesis of acne. A prospective observational study was conducted for 12 months to evaluate acne in childhood/preadolescent age in 32 different pediatric ambulatory clinics and to investigate the prevalence, clinical features, risk factors, and treatments of acne in 9–14-year-old patients.

Out of 683 children, 49.2% were males and 50.8% being females, 11.05 ± 1.4 years was the mean age of the study population, 98.8% were Caucasian. About 33.1% of female subjects had attained menarche as against 11% of male patients had spermarche. History of acne was recorded in 10.4% of the patients, history of neonatal acne was found in 6.7%, infantile, and mid-childhood acne in 1.0% and 2.6%, respectively. At pediatric consultation, 34.3% of the patients had acne, which was similar to the one report in Korean children (36.2%) but higher when compared to a report from Taiwan (17.5%).

Acne prevalence increased with age, being lowest at 9 years (6%) and higher after 13 years (6%) of age, which is comparable to the prevalence of inflammatory acne in the age group of 7–9 years, reported from Taiwan (between 1.8% and 3.9%).

Although acne was more common in females and it did not approach statistical

JAYPEE BROTHERS

significance (59.4% females), even menarche was associated with childhood/preadolescent acne without reaching statistical significance (52.5%). Spermarche did not have any statistically significance in acne patients. In this study, 47.5% of girls and 73.6% of boys with acne did not present menarche or spermarche, respectively, showing that acne can frequently appear before puberty, which is similar to earlier report that higher number of comedones or inflammatory lesions before the onset of puberty is closely related to subsequent development of severe acne.

The face (98.7%) was the most common site of involvement, followed by the trunk (16.3%) and the neck (8.2%). Younger children had lesions on the cheeks and older children on the face, which reflect the natural course of acne as it starts with predominantly noninflammatory lesions, followed by an increase in inflammatory lesions, and it also has a wider distribution.

Mild or almost clear disease severity (GEA scale 1 or 2) was found in 88.5% of patients, suggesting that moderate to severe forms of the disease are very rare in preadolescent age. The severe or very severe forms (GEA scale 4 or 5) were found only in 1.7% of the cases. About one-fourth (21.4%) of the patients were on pharmacologic therapy for acne, and half (56.4%) of the patients were on dermocosmetic therapy prescribed by the pediatrician. A dermatological consultation was done by 25.9% of the patients, whereas pediatricians prescribed pharmacological acne therapy in 74.1% and dermocosmetic treatment in 91.3% of the cases.

Some studies report that approximately one-third of the children who had used some type of acne treatment based on a pharmacy visit, cosmetics, or self-medication instead of visiting a dermatologist or a pediatrician. This reflects inadequate treatment seeking behavior. The topical antibiotics were the most common prescribed treatment in acne patients (29.6%), followed by benzoyl peroxide (22.2%), topical retinoids with benzoyl peroxide (18.5%), azelaic acid (18.5%), and systemic antibiotics (14.8%), whereas dermocosmetic treatments consisted of specific soaps (96.6%), creams (39.8%), and moisturizers (31.8%).

An endocrine or metabolic evaluation may be needed, if there are signs of hyperandrogenism or sexual precocity. Tetracyclines should be avoided in children less than 8 years of age and isotretinoin is primarily used in adults above 12 years of age or older. The exceptions for isotretinoin include an infant or child with severe or recalcitrant, nodulocystic acne that is likely to develop scarring. The use of oral contraceptive and hormonal therapies for acne should be reserved for women who have been menstruating for at least 1 year. Although these patients have a mild disease, the possibility of worsening should be kept in mind and adequate treatment should be ensured. Early control of childhood acne helps to minimize the impact of the disease on the patient, as acne may persist over years.

Key Messages

- ***Acne is not a rare disease in the preadolescent population***
- ***Adequate treatment is needed in this group of patients to minimize the disease burden and avoid the possibility of worsening of acne.***

JAYPEE BROTHERS

ARTICLE 130

Confocal Microscopy in Adult Women with Acne

Muguet Guenot L, Vourc'h Jourdain M, Saint-Jean M, et al. Confocal microscopy in adult women with acne.
Int J Dermatol. 2018;57(3):278-83.

Abstract

Reflectance confocal microscopy (RCM) was done to assess infundibulum morphology in adult women with acne. Apparently, healthy forehead skin of adult women with acne showed follicles with larger diameter, thicker, and hyperkeratinized follicle border, and more keratin plugs compared with the healthy skin of healthy adult women. The mandibular-affected skin showed follicles, which were significantly larger, thicker, more hyperkeratinized, with more keratin plugs and increased inflammation compared to apparently healthy forehead skin in a given patient.

COMMENT

Acne affects 41–54% of women above 25 years of age. Mixed facial acne involving several areas (89.8%) and acne localized to the mandible (11.2%) are the two types of adult acne. There are two types, continuous acne with an onset in adolescence that may include periods of remission, and in 20% of cases, adult-onset acne appearing between the age of 25 years and 40 years.

Follicular hyperkeratinization, sebum composition alteration, sebum hyperproduction, proliferation of *Propionibacterium acnes* (*P. acnes*), hormonal dysregulation, and chronic inflammation are the various etiologies resulting in acne. The microcomedo is considered the first histological lesion in acne and *P. acnes* could play a role by modulating keratinocyte differentiation and proliferation.

Reflectance confocal microscopy is a noninvasive tool allowing instantaneous visualization of skin structures at a cellular-level resolution. The study was done in adult women over 20 years of age divided into two groups. The severity of acne was determined by the Global Evaluation Acne (GEA) scale. Clinical count of comedones, papules, pustules, and nodules was done. Seborrhea was given a scoring of 0 for no seborrhea and 4 for severe. Women without history of acne were taken as control.

Two groups of 15 adult women with acne were included in an 18-months study. The first group consisted of 15 patients with diffuse acne lesions on face involving the forehead, cheeks, and chin. On a visually healthy skin of forehead, two 3 × 3 mm Vivacubes were obtained using VivaScope® 1500. The same was obtained from 6 adult women with no history of acne.

The second group had 15 patients with mandibular acne, who were their own control to compare the lesion-free forehead area and the involved mandibular area. Two 3 × 3 mm Vivacubes were obtained, one over the acne-free forehead region and the other over the mandibular area with acne. The same was

JAYPEE BROTHERS

obtained from 6 adult women with no history of acne.

The first group of 15 women with diffuse acne, when assessed on the healthy skin over the forehead, showed follicles with larger diameter, thicker (68%), and hyperkeratinized follicle border (65%), and more keratin plugs (44%) than healthy skin in healthy controls. Signs of inflammation were seen in 19.6% of follicles in patients with acne in group one compared to 9.2% in the controls.

Second group of 15 adult women with acne over mandibular zone showed follicles over the mandible, which were significantly larger, thicker (76%), more hyperkeratinized (72%), with more keratin plugs (47%) and increased inflammation (23%), compared with the healthy forehead skin in a given patient. The control group did not show any difference in the follicles on the forehead and the mandible except the keratin plugs were more on forehead.

Adult women with acne had higher hyperkeratinization over healthy forehead skin compared to healthy skin of adult women. Hyperkeratinization has an "onion-peel" like appearance on confocal microscope and plugs of keratin corresponds to microcomedo histologically. These reflect keratinization abnormalities of the follicle epithelium associated with an increased Ki-67 proliferative index and abnormal expression of keratin 6 and 16. The evaluation of the first group showed that the inflammatory signs were common around the follicle of the apparently healthy skin of adult patients with acne (19.6%), which were in accordance with the results found by Jeremy et al. Jeremy et al. showed the presence of CD3, CD4 T lymphocytes, and macrophages in the perifollicular area on the normal skin of patients with acne. An early infundibular inflammation along with the development of microcomedo is one of the initiating events of acne lesion formation in the "diffuse subtype" of adult and juvenile acne. Hence, treating both patient's normal skin and acne lesions is necessary.

Adult women with acne involving mandible were associated with early impairments of follicles developed specifically in the mandibular region compared with the forehead. The mandibular region not only had inflammatory lesions (deep cysts), but comedones and microcomedones (47%) were appreciable by confocal microscopy. Only about 0.2% of follicles had inflammation without hyperkeratinization in the mandibular area compared with 15.3% with both a thickened border with an onion-peel like appearance and a keratin plug associated with inflammation. With the above findings, it is evident that inflammatory signs seem closely related to hyperkeratinization. Isolated inflammation without hyperkeratinization was never observed. This in favor of the hypothesis that hyperkeratinization is the first cause for acne even in the mandibular inflammatory subtype of acne. Hence, the use of comedolytic should be ensured clinically.

Key Messages

- ***Microcomedo is essential for the development of acne lesions, hence, the importance of treating the entire skin surface with a topical treatment in adult acne***
- ***Although clinically inflammatory lesions are more commonly seen in mandibular acne, higher number of follicular alterations stress the role of microcomedo and comedo in mandibular acne.***

JAYPEE BROTHERS

ARTICLE 131

Erythema-directed Digital Photography for the Enhanced Evaluation of Topical Treatments for Acne Vulgaris

Micali G, Dall'Oglio F, Tedeschi A, et al. Erythema-directed digital photography for the enhanced evaluation of topical treatments for acne vulgaris.
Skin Res Technol. 2018;24(3):440-4.

Abstract

Erythema-directed digital photography is a novel approach to evaluate the efficacy and tolerability of topical acne treatments. Three cases of acne in which standard clinical photography and erythema-directed digital photography (VISIA-CR™ system) were used to evaluate acne lesions and erythema, before and after up to 12 weeks of treatment with clindamycin 1%/tretinoin 0.025% (Clin-RA), have been reported. There was a clear improvement in background erythema and a reduction in acne lesions following treatment with Clin-RA.

COMMENT

Lesion counting and global disease assessments are used to evaluate acne and the impact of topical treatments. Clinical lesion counting can be subjective to individual assessors, only assesses what is visible to the naked eye, difficult to reliably identify minimal inflammatory lesions and to differentiate between papules and early pustules. The evaluation of local side effects such as erythema, which may occur in up to 70% of patients treated with topical retinoids, is usually missed in clinical assessments. Advanced digital photography techniques may be able to supplement simple clinical assessments.

Three 12-week pivotal clinical studies involving 4,550 patients have shown that clindamycin 1%/tretinoin 0.025% (Clin-RA) is well tolerated and effective at reducing inflammatory, noninflammatory, and total acne lesions compared with its monotherapy and vehicle components. In comparison with the monotherapy and car treatment groups, local side effects such as erythema, burning, scaling, stinging, and itching with Clin-RA were no higher than and moderate in intensity. The patented, aqueous gel formulation and the presence of both solubilized and crystalline tretinoin in Clin-RA lead to favorable tolerability profile. Crystalline retinoid is slowly released on the skin surface allowing sustained cutaneous penetration.

The three patients with mild-to-moderate facial acne vulgaris (AV) reported here were treated once-daily for 8–12 weeks with a topical gel containing Clin-RA. They were evaluated before and after treatment using standard clinical photography and the VISIA-CR™ system (Canfield Scientific Inc., Fairfield, NJ, USA). The erythema-directed imaging highlights areas of redness corresponding to increased vascular flare or inflammation.

JAYPEE BROTHERS

Patient 1 was 18-year old with mild facial acne for 1 year and had been treated with benzoyl peroxide 5% gel for 4 months. Patient 2 was a 17-year-old male with moderate facial acne for 8 months and had received clindamycin 1%/benzoyl peroxide 5% for 2 months. Patient 3 was a 22-year-old female with untreated mild facial acne for 6 months. Patient 1 and 2 refused treatment due to irritation in addition patient 2 also had poor response. Patient 1, 2, and 3 showed improvement at 12, 8, and 8 weeks, respectively on comparison of the standard clinical photographs and erythema-directed digital images. Background erythema in patients 1 and 2 due to previous treatment had also improved.

In patient 3, comparison of the standard clinical photograph with the erythema-directed digital image shows that the latter allows a better visualization of the patient's noninflammatory lesions, closed comedones, appearing as white spots. Clinical and erythema-driven pictures of the patient 3 showed a marked improvement in both inflammatory and noninflammatory lesions after 8 weeks of therapy with Clin-RA. The cases presented here show that erythema-directed digital photography can enhance the evaluation of the effects of topical treatments on acne and allow more accurate assessment of patients' acne lesions compared with clinical assessment alone. Erythema-directed digital photography allows accurate assessment of both inflammatory and noninflammatory lesions, and erythema before and after treatment. Imaging allows clear differentiation of erythema related to active acne lesions and that resulting from previous treatments (background erythema). The tolerability of treatment can be assessed easily by determining the changes in background erythema.

The VISIA-CR™ system used in this study has previously been used to accurately and reproducibly, autoclassify and count inflammatory and noninflammatory acne lesions. This avoids the tedious and subjective process of manual lesion counting. Patient 1 and 2 had irritation with previous treatment, which was evident as background erythema. However, both patients had a marked improvement in their acne, as well as an improvement in erythema after switching to Clin-RA. These instances confirm that Clin-RA is not an irritant and that patients are well tolerated owing to its distinctive structure and mixture of solubilized and crystalline tretinoin to slowly release the retinoid on the surface of the skin. Three pivotal studies of this fixed combination showed that Clin-RA was better tolerated than adapalene 0.1%/benzoyl peroxide 2.5% being associated with significantly less burning/stinging and itching ($p < 0.001$) as well as significantly lower transepidermal water loss, an objective measure of skin irritation. Another 3-week research showed that Clin-RA was better tolerated than 0.1% tretinoin microsphere gel, a retinoid deemed to be highly tolerable. Fixed combinations containing two antimicrobial agents are regarded as suboptimal as they lack a retinoid to target the microcomedone. The Global Alliance to Improve Outcomes in Acne group recommends fixed-dose combinations that combine a retinoid with an antimicrobial agent for most acne patients as they are associated with faster and more effective lesion clearance than monotherapies.

JAYPEE BROTHERS

Key Messages

- ***Erythema-directed digital photography enhances the evaluation of the efficacy and tolerability of topical acne treatments***
- ***In this study, Clin-RA showed an improved efficacy and tolerability versus previous treatments with topical monotherapy (benzoyl peroxide 5%) or a topical fixed-dose combination (clindamycin 1%/benzoyl peroxide 5%).***

ARTICLE 132

Acne Vulgaris: The Metabolic Syndrome of the Pilosebaceous Follicle

Melnik BC. Acne vulgaris: The metabolic syndrome of the pilosebaceous follicle.
Clin Dermatol. 2018;36(1):29-40.

Abstract

The prevalence rates of acne are higher in developed countries. No acne has been found in non-Westernized populations still living under Paleolithic dietary conditions. Western diet overstimulates mechanistic target of rapamycin complex 1 (mTORC1). Increased mTORC1 activity has been detected in lesional skin and sebaceous glands of patients with acne. Obesity, type 2 diabetes mellitus (T2DM), cancer, and neurodegenerative diseases exhibit increased mTORC1 signaling, which is a characteristic feature of insulin resistance. Acne vulgaris (AV) is a member of mTORC1-driven diseases of civilization.

COMMENT

In non-Westernized populations, living under Paleolithic dietary conditions and constraining hyperglycemic carbohydrates, milk, and dairy products, no acne has been found. High intake of sugar and other hyperglycemic carbohydrates, milk, and other dairy products are a characteristic of a Neolithic western diet. The above diet increases the insulin, insulin-like growth factor 1 (IGF-1), and mechanistic target of rapamycin complex 1 (mTORC1) signaling, which have been implicated as playing a key role in pathogenesis. Insulin/IGF-1 signaling growth, and anabolism are promoted by the branched-chain essential amino acids (BCAAs), which activate the growth factor and nutrient-sensitive kinase mTORC1. A Western diet also includes excessive amounts

JAYPEE BROTHERS

of essential BCAAs, which contribute to overstimulation of mTORC1 signaling.

Hyperglycemic carbohydrates induce postprandial rise of serum insulin levels and insulin signals activating mTORC. Milk transfers microRNAs that are transported via exosomes, which target and inhibit the expression of DNA methyltransferase 1 (DNMT1) and DNMT3B. DNMT inhibition increases the expression of nuclear factor erythroid 2-related factor, which promotes the expression of mTOR. mTOR is the core component of the mTORC1 and mTORC2 complexes.

Palmitic acid is abundant in dietary fat and milk lipids. Palmitic acid activates mTORC1 at the lysosomal membrane, the same location where BCAAs activate mTORC1. In the skin of patients with acne, there is enhanced expression of mTOR and activated S6K1. Increased signaling of mTORC1 activates kinase S6K1, which creates insulin resistance through phosphorylation of IRS-1. Adiponectin improves insulin sensitivity and activates AMP kinase, leading to inhibition of mTORC1. Low expression of adiponectin sebocytes of patients with acne enhances mTORC1 signaling and further insulin resistance.

Testosterone and dihydrotestosterone have a role in sebaceous lipogenesis, sebaceous gland hypertrophy, and acne vulgaris. Androgen receptor (AR) signaling increases the activity of mTORC2, which activates the kinase AKT, similar to insulin and IGF-1. AR negatively regulates the expression of DEP domain-containing mTOR-interacting protein (DEPTOR), a natural inhibitor of mTORC1 and mTORC2.

The mTORC1 plays an important role for the translation of the key transcription factor of sebaceous lipogenesis sterol regulatory element-binding protein 1 (SREBP1). SREBP1 and AR, the transcription factors, are both repressed in the nucleus by the metabolic transcription factor FoxO1. Nuclear FoxO1 activity is inhibited by enhanced insulin/IGF-1 signals in human sebocytes and sebaceous glands in patients with acne. There is not only a quantitative change of sebum (hyperseborrhea) but also qualitative modifications of sebum (dysseborrhea) with an increase of monounsaturated fatty acids promote acne pathogenesis.

Most fatty acids are covalently bound in triacylglycerol in ordinary sebum. The quantities of complete free fatty acids produced in acne patients are more than 50% greater than those of age-matched controls without acne. Triacylglycerol lipase releases the free fatty acids, which is a virulence factor of *Propionibacterium acnes* that is upregulated in *P. acnes* biofilm.

Free oleic acid has been found to enhance calcium influx into epidermal keratinocytes, increase keratinocyte proliferation, and induce abnormal keratinization and barrier function associated with increased release of interleukin (IL)-1α, which play a crucial role in comedogenesis. Oleic acid, squalene, and their peroxides cause relatively big comedones in the follicular infundibulum associated with marked epithelial hyperplasia and hyperkeratosis. Palmitic acid-mediated TLR2 activation increases the expression of NLRP3 and induces inflammasome-mediated IL-1β production, IL-1β expression is upregulated in sebaceous glands of acne lesions.

Fatty acid metabolism is involved in T-helper 17 (Th17) cell differentiation. Acetyl-CoA carboxylase 1 (ACC1), which is the rate-limiting enzyme of sebaceous de novo fatty acid synthesis, has been found to favor Th17 cell development over regulatory T cells

JAYPEE BROTHERS

in mice. SREBP1, which is an mTORC1-dependent lipogenic transcription factor, induces expression of ACC1. Sebum-derived fatty acids, especially free oleic acid, promote a Th17-regulated inflammatory microenvironment of the sebaceous follicle observed in acne vulgaris.

The most effective treatment for acne, isotretinoin, does not attenuate sebocyte metabolic activity but causes sebocyte-induced apoptosis. The activity of mTOR is reduced by topical application of the ACC inhibitor olumacostat glasaretil (OG), eicosapentaenoic acid (EPA), and docosahexaenoic acid (DHA). Polyphenols, derived from plants such as epigallocatechin-3-gallate in green tea and resveratrol in grapes and berries, also inhibit mTORC1. The substitution of vitamin D in acne leads to attenuation of mTORC1 signaling, which may reduce sebum production and increase the expression of the antimicrobial peptide cathelicidin, which is able to kill *P. acnes*.

To conclude, there is a need for medications that attenuate mTORC1/SREBP1-mediated sebum production by regulation of mTORC1- and FoxO1-dependent signaling pathways.

Key Messages

- ***Acne vulgaris has been identified as a member of the family of mTORC1-driven metabolic diseases, such as obesity, type 2 diabetes mellitus, and cancer, and is a disease of Western civilization***
- ***A western diet, especially hyperglycemic load and milk consumption, increases mTORC1/SREBP1 signaling, and IGF-1–mediated mTORC1 activation during puberty, which eventually leads to acne vulgaris.***

ARTICLE 133

Circular RNA Expression Profile Analysis of Severe Acne by RNA-Seq and Bioinformatics

Liang J, Wu X, Sun S, et al. Circular RNA expression profile analysis of severe acne by RNA-Seq and bioinformatics. ***J Eur Acad Dermatol Venereol. 2018;32(11):1986-92.***

Abstract

Acne is a chronic inflammatory disease of pilosebaceous units. In recent past, circular RNAs (circRNAs) have been known to play a role in many biological processes and human diseases by regulating gene expression through circRNA-miRNA-mRNA networks. This study was done to investigate circRNA expression profile in severe acne and the circRNAs were differentially expressed in severe acne. The circRNAs could be used as a potential biomarker for developing newer drugs to treat acne.

JAYPEE BROTHERS

COMMENT

Acne, a chronic skin disease, characterized by inflammatory, noninflammatory lesions, seborrhea, and/or various degrees of scarring, has multifactorial etiology and pathogenesis. In recent past, circular RNAs (circRNAs) have been known to play a role in many biological processes and human diseases by regulating gene expression through circRNA-miRNA-mRNA networks. Since, the circRNAs expression in patients with acne is still unknown, this study was done to investigate circRNA expression profile in severe acne.

A total of 7 subjects with clinical diagnosis of severe acne (grade IV) confirmed by two dermatologists were included in the study. A paired lesional and adjacent nonlesional skin located about 2 cm from the affected area was taken from each subject. The samples from three males with a mean age of 22.3 years were subjected to RNA-seq analysis. The samples collected from 4 males with a mean age of 21.0 years were analyzed by polymerase chain reaction (PCR), Sanger sequencing, and qRT-PCR.

Three paired lesion skin and adjacent nonlesional skin in severe acne patients were assessed and expression profile of circRNAs was detected by high-throughput RNA sequencing technology and bioinformatics analysis. The validation of candidate circRNAs was done by PCR, Sanger sequencing, and qRT-PCR, and the circRNA-miRNA-mRNA interaction networks were predicted.

There were 271 upregulated and 267 downregulated circRNAs, a total of 538 circRNAs, which were differentially expressed in lesional skin compared with adjacent nonlesional skin in severe acne. Gene Ontology and KEGG pathway enrichment analyses were done, which showed that the aberrantly expressed circRNAs were primarily involved in inflammatory, metabolism, and immune responses. When PCR, Sanger sequencing, and qRT-PCR were done, 5 candidate circRNAs (circRNA_0084927, circRNA_0001073, circRNA_0005941, circRNA_0086376, and circRNA_0018168) were validated to have significant decrease in severe acne, similar to the results from RNA-Seq data analysis. These 5 circRNAs, that were identified, were predicted to interact with 213 circRNAs. The identified circRNAs also regulated target gene expression.

The circRNAs were differentially expressed in severe acne and could be used as a potential biomarker for developing newer drugs to treat acne.

Key Messages

- ***The circRNAs were differentially expressed in severe acne***
- ***The circRNAs could be used as a potential biomarker for developing newer drugs to treat acne.***

JAYPEE BROTHERS

ARTICLE 134

Taxonomy and Phylogeny of *Cutibacterium* (formerly *Propionibacterium*) *acnes* in Inflammatory Skin Diseases

Corvec S, Dagnelie MA, Khammari A, et al. Taxonomy and phylogeny of *Cutibacterium* (formerly *Propionibacterium*) *acnes* in inflammatory skin diseases.
Ann Dermatol Venereol. 2019;146(1):26-30.

Abstract

Propionibacterium acnes is termed as *Cutibacterium acnes* after undergoing various term changes since its discovery. *Cutibacterium* includes five species within the cutaneous ecosystem. Finer distinction between species and subspecies is done with modern microbiological techniques, which also enables the identification of separate subtypes within the population of *Cutibacterium acnes*. Phylogeny and molecular typing techniques thus provide a better understanding of the subtypes involved in acne.

COMMENT

Propionibacterium acnes is one of the predominant bacteria found within the pilosebaceous follicles and their orifices. It forms part of the cutaneous microbiota. Propionic acid from lactose is fermented under anaerobic conditions to give an acidic cutaneous pH that hampers the implantation of pathogenic bacteria such as *Staphylococcus aureus* and *Streptococcus pyogenes*. All the earlier types of cutaneous *Propionibacterium* are now subsumed under a new bacterial genus named *Cutibacterium*. Within the population of *C. acnes* and its subtypes, which were initially determined by partial sequencing of the genes *recA* and *tly*, genomic techniques have enabled the identification of six phylogenetic groups—IA1, IA2, IB, IC, II and III. The development of acne is not correlated with an increase in the relative abundance of *C. acnes* in pilosebaceous follicles. It is more of an imbalance of the bacterial flora within the same subgroups of *C. acnes*, with loss of diversity of the subgroups and over-representation of a single phylotype, particularly phylotype IA1. The host plays an important role in terms of the composition of individual sebum, microbiota, and activation levels of innate immunity. Through their interaction with toll-like receptors (TLR), particularly TLR2 and TLR4, strains of *C. acnes* stimulate innate immunity. Interactions within the microbiota have recently been found to have a major role in the physiopathology of this chronic inflammatory skin disease with a new key factor—*Staphylococcus epidermidis*. *Staphylococcus epidermidis* acts on homeostasis of the cutaneous microbiota by interacting with the different phylogenetic groups of *C. acnes*. Thus, microbial balance of the skin is partly related to the action of each species bacteriocins active against other

JAYPEE BROTHERS

for detailed information on dermatology books, visit our website **www.jaypeebrothers.com,** for detailed information on dermat

Year Book of Dermatology – 2019 *ACNE*

Key Features

- The *Year Book of Dermatology – 2019 Acne* brings to you a collection of meticulously chosen articles focusing on the recent advances in the management of acne
- Articles selected from various peer reviewed journals that were published in the last 12-month period
- In-depth evidence-based discussion on clinical management of acne with a variety of treatment options such as hormonal, pharmacological and nonpharmacological therapy provides useful insights
- Each article has been reviewed by subject reviewers who have written comments on value of the article, previous knowledge on the subject, what the article adds to the prevailing knowledge and practices, strong points and weaknesses of the article and other similar observations that have come in the last 12-month period
- Each article is accompanied by key messages, summarizing the article as well as highlighting the clinical experience of the reviewers
- A must read book for dermatologists, physicians and postgraduate students.

Shashi Kumar BM
MD (DVL) FIADVL (Dermatopath)
Associate Professor
Department of Dermatology
Mandya Institute of Medical Sciences
Mandya, Karnataka, India

Savitha AS
MD (DVL) DNB FRGUHS (Dermatosurgery)
Associate Professor
Department of Dermatology
Sapthagiri Institute of Medical Science and Research Center
Bengaluru, Karnataka, India

R Raghunatha Reddy
MD (DVL) DNB FRGUHS (Dermatosurgery)
Professor and Head
Department of Dermatology
Akash Institute of Medical Sciences and Research Centre
Bengaluru, Karnataka, India

Available at all medical bookstores
or buy online at www.jaypeebrothers.com



JAYPEE BROTHERS
Medical Publishers (P) Ltd.
www.jaypeebrothers.com
Join us on facebook.com/JaypeeMedicalPublishers

Shelving Recommendation
DERMATOLOGY

