

Original Article

Clinico-epidemiological Profile of Adult Acne and factors Associated with Adult Acne

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Abstract: Acne is a chronic inflammatory disease of the pilosebaceous unit and a skin condition that affects 80% of young people, making it one of the most common disorders affecting adolescents. Despite the fact that physiological acne affects 54% of women and 40% of men, the prevalence of the condition does not decline with age. Adult acne symptoms include increased sebum production, abnormal keratinization within the follicle, and bacterial colonization of the pilosebaceous duct by *Propionibacterium acnes*. These symptoms are similar to those that are associated with acne in adolescents. This study determined the clinical and epidemiological features of adult acne and discussed the factors associated with Adult Acne. It is a hospital based descriptive cross-sectional study conducted among the patients attending the outpatient department (OPD). Purposive sampling technique was adopted to obtain the participants from department of dermatology and venereology at B. P. Koirala Institute of Health Sciences, Dharan, Nepal. N= 161 participants aged 25 years or above, participants attending dermatologic outpatient department in BPKIHS, Dharan has been selected for the study. Data has been analyzed on statistical package for social sciences (SPSS), alpha numerical codes also used. Bi-variate analysis for association was done using appropriate test of significance (chi-square test, t-test, Man-whitney test, Kruskal Wallis H test, one way ANOVA). Multivariable binary logistic regression was then further done to find the adjusted odds ratio for the determinants. Statistical significance was tested with 95% confidence interval and p value less than 0.05 was considered significant. The findings from this study warrants need for interventions targeting for behavioural and dietary modification to reduce the severity of acne, and its impact on quality of life. Further studies considering a control group could better evaluate the factors associated with acne among adult population.

Keywords: epidemiology, pilosebaceous, adult acne, Nepal

1. INTRODUCTION

A chronic inflammatory disease of the pilosebaceous unit, acne is a skin condition, because it affects eighty percent of young people, it is one of the most prevalent disorders that affect adolescents [1]. Despite the fact that physiological acne is found in 54% of women and 40% of men, the prevalence of this condition does not decrease with age [2]. Teenagers are the most likely to experience it. Adult acne is a form of acne that occurs after the age of 25 and is characterised by two primary subtypes: juvenile acne and adult acne. Acne that persists into adulthood is a subtype of acne that initially appears during the teenage years. In this subtype, the lesions that were present during adolescence continue to be present in adulthood [3]. In most cases, the lesions are papulonodular in appearance and are primarily located on the lower portion of the face and the neck [4]. Late-onset acne is characterised by the appearance of acne for the first time after the age of 25. There is a difference between "late onset" acne, which begins after the age of 25 years, and "persistent" acne, which continues after entering adolescence [5]. It is responsible for eighty percent of instances and twenty percent of cases, respectively [6]. The vast majority of cases are considered to be persistent when they involve adults. Acne is more common in women than it is in males, and in the case of boys, acne typically goes away after they reach their teenage years. There are instances of late-onset acne, which occurs after the age of 25, despite the fact that persistent acne is the more common. In recent years, there has been a rise in the age at which acne first appears, primarily in females between the ages of 20.5 and 26.5 years [7]. The lesions that are characteristic of adult acne are primarily papules and pustules, and there are no comedones present. This is in contrast to the acne that is found in teenagers. In the past, these lesions of adult acne were diagnosed as acneiform eruption rather than as real acne. This was due to the belief that they were caused by external agents such as medications, cosmetics, chemical products, and so on [8]. When it comes to adult acne, the severity of the condition often ranges from mild to moderate, with inflammatory lesions being the predominant kind [9]. In addition to inflammatory lesions, the cheeks may also exhibit comedones, as well as deep and indolent nodules that have been present for a considerable amount of time. These comedones and nodules are the cause of residual hyperpigmentation. In addition, acne that develops later in life is characterised by a smaller number of total lesions, the majority of which are situated in the U-zone. There was a correlation between acne and a number of characteristics, including a history of acne in first-degree relatives, the absence of prior pregnancies, a history of hirsutism, working as an office worker, a greater level of psychological stress, and certain dietary factors, such as a low consumption of vegetables or fruits and fish [10]. Researchers found a correlation between smoking tobacco and more severe kinds of acne [11]. A significant diagnostic consideration for any female patient who is experiencing acne is the presence of an underlying endocrine disease, particularly hyperandrogenism. The quick reappearance of acne after treatment with isotretinoin is a strong indicator of the presence of this condition [12]. Women who have acne are more likely to have high levels of androgens, and it is impossible to rule out the possibility that their local production occurs throughout the process. Studies have shown that women who suffer from acne had significantly higher levels of DHEA-S, androstenedione, testosterone, and dihydrotestosterone than women who do not have acne [13]. Acne in women is especially vulnerable to hormonal changes that occur during the menstrual cycle. In a research, approximately seventy percent of women who were evaluated stated that their acne had become worse during the premenstrual period. Controversy continues to surround the question of whether or not cosmetics play a role in acne flare-ups [14]. It is common knowledge that acne in adults has a negative impact on one's quality of life. The development of acne in adults can result in a decline in self-esteem, a poor picture of the body, and psychological stress. The existence of scars is the primary

factor that contributes to the negative impact on quality of life [15]. It would appear that acne in adults is a widespread issue, and there has been a rise in the incidence of acne in adults over the course of the past two decades. Within the teenage population, acne is one of the most prevalent diseases. Physiological acne is a condition that affects adults in a percentage of 54% of women and 40% of men [16]. One of the most important factors in the development of acne is the stimulation of sebaceous glands by androgenic agents. Environmental variables are the ones that are responsible for the development of clinical disease, despite the fact that hereditary factors can have an effect on sebum excretion. Acne is most likely caused by an exaggerated reaction of the pilosebaceous unit to the typical quantities of androgen that are circulating in the body [17]. The condition known as adult acne is characterised by the presence of acne in individuals who are over the age of 25. It is possible to distinguish between two primary subtypes of adult acne: chronic acne and late-onset acne, which occurs after the age of 25 years. These two types of acne account for 80% and 20% of instances, respectively [18]. The majority of patients appear with acne that is chronic; however, late-onset acne is prevalent in roughly twenty percent of women and ten percent of men. In terms of its pathogenesis, acne is a complicated disease. One can trace its roots back to the pilosebaceous unit. There are four clear variables that are responsible for the pathophysiology of acne. These factors are inflammation, colonisation with *Propionibacterium acnes*, increased production of sebum, and hyperkeratosis of the pilosebaceous duct [19]. Increased sebum production, aberrant keratinization inside the follicle, and bacterial colonisation of the pilosebaceous duct by *Propionibacterium acnes* are all symptoms that are associated with the pathogenesis of adult acne [20]. These symptoms are similar to those that are associated with acne in adolescents. There are other factors that contribute to the development of acne in adults; nevertheless, the androgenic stimulation of sebaceous glands is a significant contributor to the development of acne. Environmental variables are the ones that are responsible for the development of clinical disease, despite the fact that hereditary factors can have an effect on sebum excretion. Acne is most likely caused by an exaggerated reaction of the pilosebaceous unit to the typical quantities of androgen that are circulating in the body [21]. In addition to the causes that have been outlined earlier for acne, the pathogenesis of acne in adult women is a complicated process that involves a number of different factors, including androgens, genetics, nutrition, medicine, and cosmetics [22]. The purpose of this study is to determine the clinico-epidemiological profile of adult acne, as well as the influence that adult acne has on quality of life, and to investigate the roles that various factors, such as family history, smoking habits, occupation, comorbidities, psychological stress, and dietary determinants, have in the development of acne in adults.

2. MATERIALS AND METHODS

It is a hospital based descriptive cross-sectional study conducted among the patients attending the outpatient department (OPD), Department of Dermatology and Venereology at B. P. Koirala Institute of Health Sciences, Dharan. Patients attending the OPD at Department of Dermatology and Venereology at B. P. Koirala Institute of Health Sciences, Dharan, diagnosed with adult acne. All consecutive patients with diagnosis of adult acne clinically, attending the Dermatology outpatient department at B. P. Koirala Institute of Health Sciences, Dharan who fulfilled the inclusion criteria were enrolled in the study. Informed and written consent were taken from all the patients willing to participate. Demographic data were recorded in the preset proforma. Participants aged 25 years or above, participants attending dermatologic outpatient department in BPKIHS, Dharan. The sample size was calculated, based on study by Poli et al in 2001, where the prevalence of late onset adult acne was 41% [23].

So, we have, $p = 41\%$, and $q = 100 - p = 59\%$

This study considered 5% significance level ($\alpha = 0.05$) and power of 80% ($\beta = 0.2$) to determine the sample size.

So, $z = 1.96$ (at 5% significance level), and

allowable error (L) = 20% of $p = 20\% \times 41\% = 8.2\%$

Now, we have

$$\begin{aligned}\text{Sample size (N)} &= z^2 pq / L^2, \\ &= 1.962 \times 41 \times 59 / 8.22\end{aligned}$$

$= 138.2 = 139$ (taking next whole number)

Adding 15% for non-response, or incomplete data, the sample size has been inflated to 161. Purposive sampling technique was adopted to obtain the participants. All the participants meeting the inclusion criteria for the study were approached, explained regarding the study, and those consenting for participation were included in the study. The participants were enrolled in the study till the sample size was met. A detailed history was taken using a questionnaire including general socio-demographic information (age, sex, race, religion, education, occupation and marital status), information regarding personal habits (smoking and alcohol consumption), pregnancy, menstrual pattern, use of oral contraceptives, history of adolescence acne, history of acne in relatives, relevant comorbidities (polycystic ovary syndrome (PCOS), hirsutism, type II diabetes, and thyroid disease), and factors aggravating acne (sun exposure and stress) and these data were recorded in preset proforma. A food frequency was calculated using number of portions per week in the last month. The food items evaluated in study included meat, fish, fruits, vegetables and milk. Intakes of foods that were reported at least once a month but less than once a week were coded as 0.5 portions per week and were recorded in preset proforma. Height and weight were measured and the body mass index ($BMI = \text{weight}/\text{height}^2$) was also calculated. BMI was categorized as underweight ($<18.5 \text{ kg/m}^2$), normal ($18.5 - 22.9 \text{ kg/m}^2$), at risk (overweight) ($23 - 24.9 \text{ kg/m}^2$) and obese ($\geq 25 \text{ kg/m}^2$). Patients were examined for clinical evidence of acne, distribution, type of lesions and severity. The specific signs of post inflammatory hyperpigmentation and atrophic scars were observed in all patients. Quality of life was measured in adult acne patients, using the Nepali version of dermatology life quality index (DLQI) questionnaire. DLQI contained 10 questions which involved 6 sections: symptoms and feelings, daily activities, leisure, work and school, personal relationships and treatment. Question 1 and 2 assessed symptoms and feelings; 3 and 4, daily activities; 5 and 6, leisure; 7, work and school; 8 and 9, personal relationships and 10, treatment. The DLQI consists of 10 questions in which each question is given 4 options from not at all effect (score 0) to very much effect (score 3). The minimum and maximum possible score, thus, is 0 and 30 respectively. Data was entered in Microsoft Excel, and converted into Statistical Package for Social Sciences for statistical analysis. Alpha numerical codes were used. Bi-variate analysis for association was done using appropriate test of significance (chi-square test, t-test, Man-whitney test, Kruskal Wallis H test, one way ANOVA). Multivariable binary logistic regression was then further done to find the adjusted odds ratio for the determinants. Statistical significance was tested with 95% confidence interval and p value less than 0.05 was considered significant.

3. RESULTS AND DISCUSSION

This study was carried out to evaluate the clinico- epidemiological profile of adult acne and quality of their life being affected by it. One hundred and sixty-one (161) patients clinically diagnosed of adult acne attending the outpatient department of Dermatology and Venereology of B.P. Koirala Institute of Health Sciences, Dharan were enrolled in the study.

3.1. Socio-demographic characteristics:

The age of the participants ranged from 25 to 49 years. The mean age of the study population was 30.05 ± 4.50 years. The majority of the patients (52.8%) belonged to the age group of 25-29 years, followed by 28.6% of patients who belonged to the age group 30-34 years. Similarly, the majority of patients (82%) were females and 18% were males

Table 01: Distribution according to age and gender (n = 161)

Characteristics	Categories	Frequency	Percentage
Age (in years)	25 – 29	85	52.8
	30 – 34	46	28.6
	35 – 39	24	14.9
	≥ 40	6	3.7
Mean $\pm$ SD (min,max)		30.05 $\pm$ 4.50 (25,49)	
Sex	Female	132	82.0
	Male	29	18.0
	Total	161	100.0

Among the cases, 74.5% were from Sunsari, 14.9% were from Morang, 3.1% were from Dhankuta, 3.1% were from Saptari, 12.5% were from Jhapa, 0.6% was from Illam, and 1.2% from India.

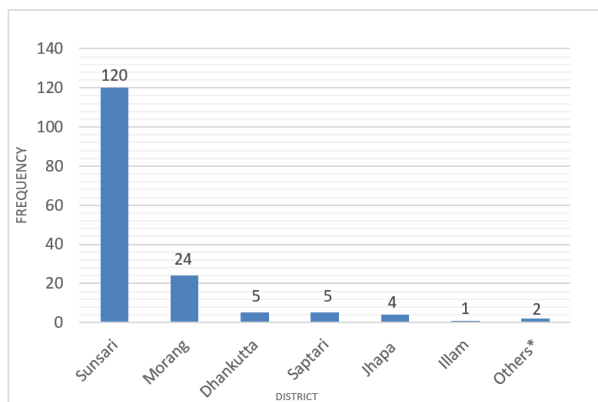


Figure 01: Distribution of cases according to address (n = 161) * Cases from India

3.1.1 Religion and racial distribution

The majority of the study population, i.e. 149 (92.5%) were Hindu, followed by 6 (3.7%) Buddhist, 5 (3.1%) Muslim and 1 (0.6%) Christian. The majority of cases, i.e. 92 (57.14%) were of Aryan race and 69 (42.86%) cases were of the Mongolian race.

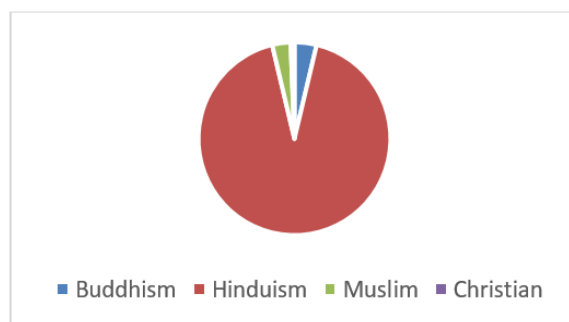


Figure 02: Distribution of cases according to religion (n = 161)

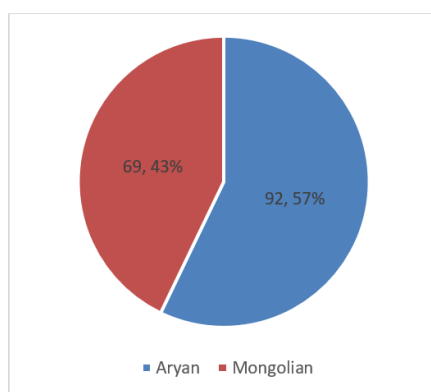


Figure 03: Distribution of cases according to race (n = 161)

3.1.2 Marital status, Education and Employment

In this study, 123 (76.4%) cases were married and 38 (23.6%) cases were single. Unmarried and divorced participants were included in the category “single”. The majority of the study population, i.e. 50 (31.1%) had completed secondary level of education followed by 47 (29.2%) completing higher secondary level of education. In the study we had cases with different occupations. Most of them, i.e. 101 (62.7%) were homemaker, followed by 50 (31.1%) with different occupations as service holders, shopkeepers, businessman, beauticians and others and 10 (6.2%) cases were students. Unemployed people were also categorized in homemaker group.

Table 02: Distribution of cases according to marital status, education and employment (n = 161)

Characteristics	Category	Frequency	Percentage
Marital status	Married	123	76.4
	Single	38	23.6
Education	Uneducated	9	5.6
	Primary	7	4.3
	Secondary	50	31.1
	Higher secondary	47	29.2
	Graduate	40	24.8
	Post graduate	8	5.0
Employment	Student	10	6.2
	Homemaker	101	62.7
	Employed	50	31.1

3.1.3 Smoking and alcohol consumption

Regarding the smoking behavior, 22 (14%) cases were smokers. Similarly, alcohol consumption was seen in 66 (41%) cases.

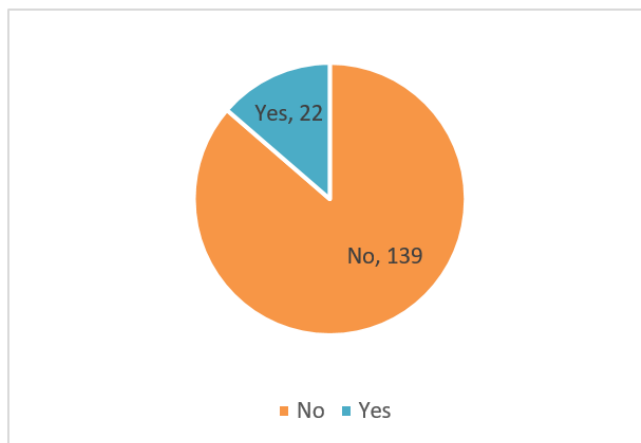


Figure 04: Distribution of cases according to smoking (n = 161)

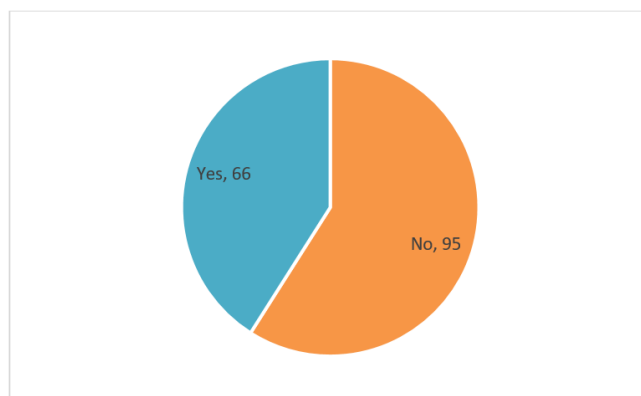


Figure 05: Distribution of cases according to alcohol consumption (n = 161)

3.1.4 Anthropometric Measurements:

The weight of the patients ranged from 40 to 90 kg, with a mean weight of 62.18 kg and a standard deviation of 10.27 kg. Similarly, the height ranged from 142.24 to 172.72 cm with a mean $\pm$ SD of 157.98 ± 5.69 cm. Body mass index ranged from 17 to 34 kg/m² with a mean of 24.39 and standard deviation of 3.59 kg/m². The majority of the patients, i.e. 64(39.8%) were pre obese, 32(19.9%) were overweight, while 48 (29.8%) had normal BMI, and 5(3.1%) cases were underweight.

Table 03: Distribution according to Body Mass Index (n = 161)

Characteristics	Category	Frequency	Percentage
Weight (Mean $\pm$ SD (Min, Max) 62.18 ± 10.27 (40, 90))			
Height (Mean $\pm$ SD (Min, Max) 157.98 ± 5.69 (142.24, 172.72))			
Body Mass Index (kg/m ²)	<18.5	5	3.1
	18.5 - 22.9	48	29.8
	23 - 24.9	32	19.9

	25 – 29.9	64	39.8
	≥ 30	12	7.5
Mean ± SD	24.39 ± 3.59		
Total		161	100.0

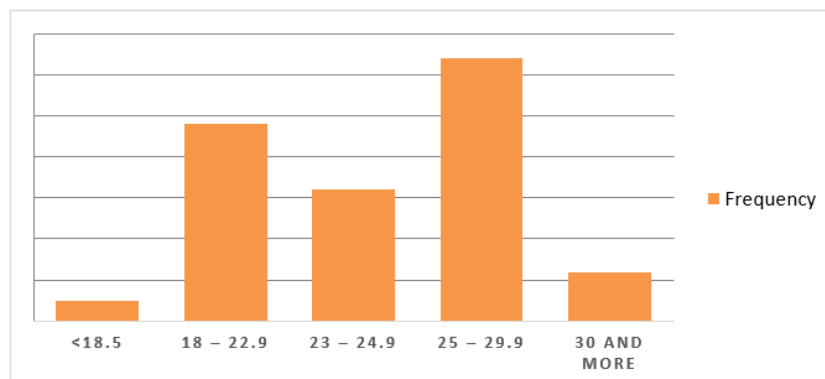


Figure 06: Distribution of cases according to Body Mass Index (n = 161)

3.1.5 Menstrual and obstetric details of female cases:

Out of total 132 female cases, 93(57.8%) had menarche at the age of 12- 15 years followed by 32 (19.9%) cases having menarche below 12 years of age and 7 (4.3%) cases having menarche after 15 years of age. More than half, 124 (77%) cases had regular menstrual cycle and 8 (5%) cases had irregular cycle. Among the cases, 88 (54.7%) had previous history of pregnancy.

Table 04: Menstrual and obstetric details of female cases (n = 161)

Characteristics	Category	Frequency	Percent
Age at menarche	<12 years	32	19.9
	12 to <15 years	93	57.8
	≥ 15 years	7	4.3
Menstrual Cycle	Irregular	8	5.0
	Regular	124	77.0
History of pregnancy	No	44	27.3
	Yes	88	54.7
Total		132	100.0

3.1.6 Clinical history of adult acne:

Majority of cases, i.e. 82 (50.9%) had onset of acne at the age of 25 to 39 years. Majority of cases, i.e. 61 (37.9%) had acne for more than 5 years. Among the cases, adolescent acne was present in 128 (79.5%) So, in this study 78.5% cases fall under persistent subtype of adult acne and only 20.5 % of cases were late onset subtype of adult acne. 64 (39.8%) patients had taken treatment previously for acne in form of various oral and topical medications.

Table 05: Distribution of cases according to acne features (n = 161)

Characteristics	Category	Frequency	Percentage
Onset age	≤ 20	47	29.2
	21 to <25	31	19.3

	25 to <40	82	50.9
	≥ 40	1	0.6
Duration	< 1 year	46	28.6
	1 to <5 years	54	33.5
	≥ 5 years	61	37.9
History of adolescent acne	Absent	33	20.5
	Present	128	79.5
Prior treatment	Yes	64	39.8
	No	97	60.2
Total		161	100.0

3.1.7 Factors associated with adult acne:

Among the cases, 54 (33.5%) had perceived no effect in acne with sun exposure, 50 (31.1%) reported worsening of acne with sun exposure and 72 (44.8%) cases reported worsening of acne with stress. Similarly, 15 (9.3%) cases had no effect in acne with menstrual cycle while 117(72.7%) reported worsening of acne with menstrual cycle. Among the cases reporting worsening of acne with menstrual cycle, worsening was seen prior to menstrual cycle in 110 (94.02%) and during the menstrual cycle in 7(5.98%) among the cases.

Table 06: Table regarding factors associated with adult acne:

Characteristics	Category	Frequency	Percentage
Sun exposure (n= 161)	No effect	54	33.5
	Worsens	50	31.1
	Don't know	57	35.4
Stress (n= 161)	No effect	26	16.1
	Worsens	72	44.8
	Don't know	63	39.1
Effect of menses (n= 132)	No effect	15	9.3
	Improves	0	0.0
	Worsens	117	72.7
	Before	110	94.02
	During	7	5.98
	After	0	0.0

Regarding food habits, majority of the cases, 123(76.4%) consumed fruits for 3 or more days per week. All the cases consumed vegetables on daily basis. Fish consumption was less than 3 days per week in all cases. Milk and meat consumption was less than 3 days per week in majority of patients i.e. 115(71.4%) and 139(86.3%) respectively.

Table 07: Table regarding food habits: (n = 161)

Food intake	Category	Frequency	Percentage
Fruits (days/week)	< 3	123	76.4
	≥ 3	38	23.6
Vegetables (days/week)	< 3	0	0.0
	≥ 3	161	100.0
Fish (days/week)	< 3	161	100.0
	≥ 3	0	100.0
Milk (days/week)	< 3	115	71.4
	≥ 3	46	28.6

Meat (days/week)	< 3	139	86.3
	≥ 3	22	13.7

Among the cases, family history of acne was present in 103 (63.97%) in which 24 (14.9%) had history of acne in parents, 68 (42.2%) had history of acne in siblings and 11 (6.8%) had history of acne in both parents and siblings.

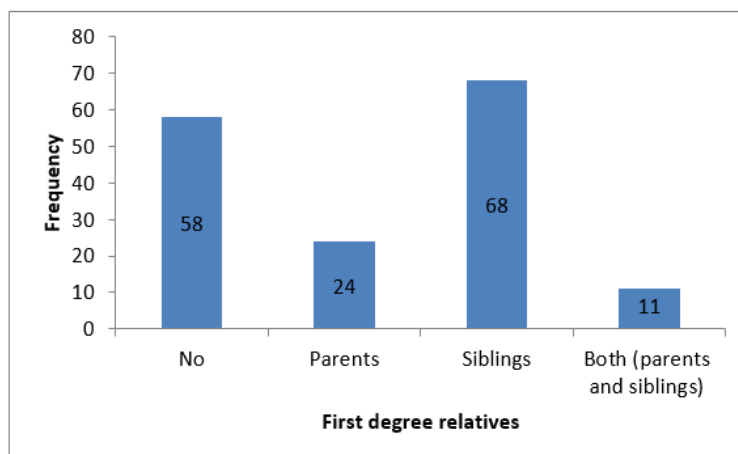


Figure 07: Family history of acne among the cases (n = 161)

3.2. Clinical examination findings of acne:

Grading of acne was done by using GAGS grading system, mild acne was seen in 42.9% of the cases, while 39.8% presented with moderate acne. Severe acne was seen in 23 (14.3%) of them, while only 5 (3.1%) cases had very severe grade of acne. Post inflammatory hyperpigmentation and atrophic scar was seen in 158 (98.1%) and 115 (71.4%) respectively. Majority of cases, 106 (65.8%) had only facial lesion with lesion predominantly located over cheek where left cheek involvement was seen in 95.65 % cases and right cheek involvement seen in 94.40% cases followed by chin involvement seen in 91.30% case, forehead in 84.47% cases, nose in 54.04% cases and truncal involvement was seen only in 34.2 % cases. Lesion types were considered with regards to six sites in each patient, which included right cheek, left cheek, chin, forehead, nose and trunk. For predominant lesion calculation, a total of 966 sites (6 sites in each cases) was considered. In our study the predominant lesions was papules seen in 55.69 % sites followed by pustules seen in 32.81 % sites, comedones seen in 20.28% sites and nodules seen only in 10.35 % sites of involvement.

Table 08: Clinical examination findings of acne (n= 161)

Characteristics	Category	Frequency	Percentage
Distribution (n= 161)	Face only	106	65.8
	Face and trunk	55	34.2
GAGS grading (n= 161)	Mild	69	42.9
	Moderate	64	39.8
	Severe	23	14.3
	Very severe	5	3.1
Post inflammatory hyperpigmentation (n= 161)	No	3	1.9
	Yes	158	98.1
Atrophic scars (n= 161)	No	46	28.6
	Yes	115	71.4

Lesions type (n = 966) (Multiple response possible)	Comedones	195	20.28
	Papules	538	55.69
	Pustules	317	32.81
	Nodules	100	10.35
Sites Involved (n= 161) (Multiple response possible)	Right cheek	152	94.40
	Left cheek	154	95.65
	Chin	147	91.30
	Forehead	136	84.47
	Nose	87	54.04
	Trunk	55	34.2

3.2.1 Medical co-morbidities:

Majority (94%) of cases did not report any comorbidities Diabetes was reported by 3 (1.9%). Similarly, hypothyroidism was reported by 3 (1.9%), hirsutism was reported by 2 (1.2%) cases, while diagnosis of PCOS was reported by 1(0.6%) among the cases.

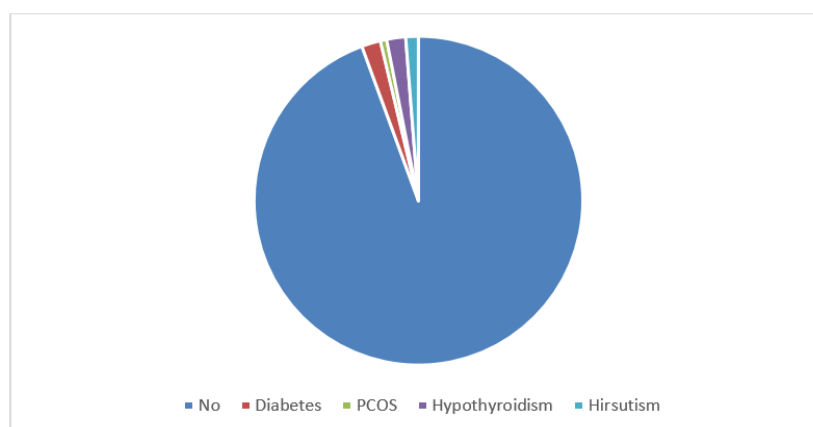


Figure 08: Medical co-morbidities among the cases (n = 161)

3.3 Dermatologic Life Quality Index (DLQI) of the study population

Quality of life among the cases was assessed by using DLQI (Dermatologic Life Quality Index). In this study, the mean DLQI of the total 161 patients was observed to be 5.329 ± 4.286 . The majority of the patients had some sensation of itching or stinging sensation (Mean $\pm$ SD = 1.286 ± 0.80). Similarly, majority of patients felt more embarrassed or became self-conscious due to acne (Mean $\pm$ SD = 1.248 ± 1.006). Interference in clothing (Mean $\pm$ SD = 0.596 ± 0.917) and going for shopping (Mean $\pm$ SD = 1.242 ± 1.071) were also seen in patients due to acne. In relation to the aspects of life represented by the DLQI sections, Symptoms and feelings was the most affected domain with a mean $\pm$ SD of 2.534 ± 1.66 followed by daily activities (mean $\pm$ SD of 1.839 ± 1.788).

Table 09: Effect in quality of life in each questionnaire (n = 161)

Questions	Mean $\pm$ SD	Median, IQR, (Min-Max)
1. Over the last week, how itchy, sore, painful or stinging has your skin been?	1.286 ± 0.8018	1, 1, (0-3)
2. Over the last week, how embarrassed or self conscious have you been because of your skin?	1.248 ± 1.006	1, 1, (0-3)
3. Over the last week, how much has your skin interfered with	1.242 ± 1.071	1, 1, (0-4)

you going shopping or looking after your home or garden?		
4. Over the last week, how much has your skin influenced the clothes you wear?	0.596± 0.9177	0, 1, (0-3)
5. Over the last week, how much has your skin affected any social or leisure activities?	0.845± 0.997	1, 1, (0-4)
6. Over the last week, how much has your skin made it difficult for you to do any sport?	0.00± 0.00	0, 0, (0-0)
7. Over the last week, has your skin prevented you from working or studying?	0.019± 0.1758	0, 0, (2-0)
8. Over the last week, how much has your skin created problems with your partner or any of your close friends or relatives?	0.00± 0.00	0, 0, (0-0)
9. Over the last week, how much has your skin caused any sexual difficulties?	0.00± 0.00	0, 0, (0-0)
10. Over the last week, how much of a problem has the treatment for your skin been, for example by making your home messy, or by taking up time?	0.093± 0.350	0, 0, (2-0)

Table 10: DLQI scores in each domain (n = 161)

DLQI Domains	Mean	Median	SD	Min, Max
Symptoms and feelings (Q1+Q2)	2.534	2	1.665	0, 6
Daily activities (Q3 + Q4)	1.839	2	1.788	0, 6
Leisure activities (Q5 + Q6)	0.845	1	0.997	0, 4
Work and schooling (Q7)	0.019	0	0.175	0, 2
Personal relationship (Q8 + Q9)	0.00	0	0.00	0, 0
Treatment of disease (Q10)	0.093	0	0.350	0, 3
Total score	5.329	5	4.286	0, 17

3.3.1 Quality of life

Categorizing the total DLQI scores, moderate effect on quality of life was seen among 57 (35.4%) cases, with no effect to small effect in 43 (26.7%) each and very large effect in 18 (11.2%) cases. No extremely large effect was observed in the quality of life among the adult acne cases. Effect in quality of life was more in case of female cases with moderate effect in 30.3% cases, small effect in 30.3% cases and large effect in 13.6% cases. In male cases, 75.9% of them had no effect in quality of life, while small and moderate effect was seen in 10.3% and 13.8% of them respectively.

Table 11: Quality of life among the adult acne cases (n = 161)

Categories	Frequency	Percentage
No effect	43	26.7
Small effect	43	26.7
Moderate effect	57	35.4
Very large effect	18	11.2
Extremely large effect	0	0.0
Total	161	100.0

Table 12: Sex distribution of Effect in quality of life (n = 161)

Severity→ Sex ↓	DLQI grading				
	No effect	Small effect	Moderate effect	Large effect	Total
Female	21 (15.9)	40 (30.3)	53 (40.2)	18 (13.6)	132 (100)
Male	22 (75.9)	3 (10.3)	4 (13.8)	0 (0)	29 (100)
Total	43 (26.7)	43 (26.7)	57 (35.4)	18 (11.2)	161 (100)

3.4 Association of Different Factors with Adult Acne

3.4.1 Association with various socio- demographic and behavioral characteristics

Severe to very severe acne was seen in 20 (15.27%) of cases who were below the age of 35 years and in 8 (26.67%) of cases who were above the age of 35 years. Similarly, males had more severe acne 34.48% compared to females 13.64%. Severity of acne was found to have statistically significant association with sex group. The proportion of severe/ very severe acne was higher among cases who were overweight (18.42 %) compared to cases with normal or low BMI (16.47%). However, the association of acne severity was not found to be significant statistically with BMI. Similarly, the proportion of severe/ very severe acne was higher among smokers (36.36%) and cases consuming alcohol (18.18%) compared to cases who do not smoke (14.39%) or consume alcohol (16.84%). Severity of acne was found to have statistically significant association with smokers. However, the association of acne severity was not found to be significant statistically with alcohol consumers.

Table 13: Association with socio-demographic and behavioural characters

Character-istics	Category	Severity			p-value
		Severe/ Very severe	Mild/ Moderate	Total	
Age	<35	20 (15.27)	111 (84.73)	131 (100)	0.137
	>35	8 (26.67)	22 (73.33)	30 (100)	
	Total	28 (17.39)	133 (82.61)	161 (100)	
Sex	Female	18 (13.64)	114 (86.36)	132 (100)	0.007
	Male	10 (34.48)	19 (65.52)	29 (100)	
	Total	28 (17.39)	133 (82.61)	161 (100)	
Smoking	No	20 (14.39)	119 (85.61)	139(100)	0.029*
	Yes	8 (36.36)	14 (63.64)	22 (100)	
	Total	28 (17.39)	133 (82.61)	161(100)	
Drinking	No	16 (16.84)	79 (83.16)	95 (100)	0.825
	Yes	12 (18.18)	54 (81.82)	66 (100)	
	Total	28 (17.39)	133 (82.61)	161 (100)	
BMI (kg/m2)	< 23	7 (13.2)	46 (86.8)	53 (100)	0.327
	≥ 23	21 (19.4)	87 (80.6)	108 (100)	
Total		28 (17.39)	133 (82.61)	161 (100)	

* Fischer Exact test applied

3.4.2 Association with characteristics related to acne

The proportion of severe and very severe acne was higher among cases who had onset before the age of 25 years (21.79 %) compared to cases with onset after the age of 25 years (13.25 %). Similarly, proportion of cases with duration less than 1 year had more severe acne (21.74%) compared to those having acne for more than 1 year (15.65%). Similarly, severe and very severe acne was seen more in cases with no history of adolescent acne (27.27%) compared to those with history of adolescent acne (14.84%). However, the association of acne severity was not found to be significant statistically with age of onset, duration of acne or history of adolescent acne.

Table 14: Association of severity with acne characteristics

Characteristics	Category	Severity			p-value	
		Severe/ severe	Very	Mild/ Moderate		Total
Age of onset (years)	< 25	17 (21.79)		61 (78.21)	78 (100)	0.153
	≥ 25	11 (13.25)		72 (86.75)	83 (100)	
	Total	28 (17.39)		133 (82.61)	161 (100)	
Duration of acne (year)	<1	10 (21.74)		36 (78.26)	46 (100)	0.357
	≥ 1	18 (15.65)		97 (84.35)	115 (100)	
	Total	28 (17.39)		133 (82.61)	161 (100)	
History of adolescent acne	Absent	9 (27.27)		24 (72.73)	33 (100)	0.093
	Present	19 (14.84)		109 (85.16)	128 (100)	
	Total	28 (17.39)		133 (82.61)	161 (100)	
Family history of acne	No	6(10.34)		52(89.66)	58(100)	0.077
	Yes	22(21.36)		81(78.64)	103 (100)	
	Total	28 (17.39)		133 (82.61)	00)	

3.4.3 Association with menstrual and obstetric details

The severity of acne was more in cases with menarche at age less than 12 years (15.63%). Severe acne was seen in 12.50% of cases with irregular cycle and 13.71% of cases with regular cycle. Similarly, severe acne was seen in 11.36% of cases with prior history of pregnancy and 18.18% of cases without prior history of pregnancy, as presented in table below. Based on age of menarche, menstrual history and history of pregnancy, the association of acne severity was not found to be statistically significant.

Table 15: Association with menstrual and obstetric history among female cases (n = 132)

Characteristics	Category	Severity			p-value	
		Severe/ severe	Very	Mild/ Moderate		Total
Age at menarche (in years)	<12	5 (15.63)		27 (84.38)	32 (100)	0.927*
	12- 15	12 (12.9)		81 (87.1)	93 (100)	
	>15	1 (14.29)		6 (85.71)	7 (100)	
	Total	18 (13.64)		114 (86.36)	132 (100)	
Menstrual history	Irregular	1 (12.5)		7 (87.5)	8 (100)	1.000*
	Regular	17 (13.71)		107 (86.29)	124 (100)	

	Total	18 (13.64)	114 (86.36)	132 (100)	
Prior history of pregnancy	No	8 (18.18)	36 (81.82)	44 (100)	0.282
	Yes	10 (11.36)	78 (88.64)	88 (100)	
	Total	18 (13.64)	114 (86.36)	132 (100)	

* Fischer exact test applied

3.4.4 Association with food intake behavior

The severity of acne was more in cases consuming fruits for 3 or more days per week (21.05%) and milk for 3 or more days/ week (32.61%) than those consuming less than 3 days/ week. In case of meat it was more in cases consuming meat less than 3 days per week (17.99%) compared to those consuming meat for 3 or more days/week (13.64%). Severity of acne was found to have statistically significant association in cases consuming milk for 3 or more days per week. However, the association of acne severity was not found to be significant statistically with fruit and meat consumers.

Table 16: Association of acne with food intake behavior

Characteristics	Category	Severity			p-value
		Severe/ severe	Very Mild/ Moderate	Total	
Fruits(days/ week)	< 3	20 (16.26)	103 (83.74)	123 (100)	0.496
	≥ 3	8 (21.05)	30 (78.95)	38 (100)	
	Total	28 (17.39)	133 (82.61)	161 (100)	
Milk (days/ week)	< 3	13 (11.3)	102 (88.7)	115 (100)	0.001
	≥ 3	15 (32.61)	31 (67.39)	46 (100)	
	Total	28 (17.39)	133 (82.61)	161 (100)	
Meat (days/ week)	< 3	25 (17.99)	114 (82.01)	139 (100)	0.768
	≥ 3	3 (13.64)	19 (86.36)	22 (100)	
	Total	28 (17.39)	133 (82.61)	161 (100)	

3.4.5 Association of acne severity with perceived effect of stressors

The severity of acne was more in cases who reported aggravation of acne with menstrual cycle (14.53%), aggravation with sun exposure (28%) and aggravation with stress (18.06%). Association of acne severity was statistically significant with sun exposure. However, the association of acne severity was not found to be significant statistically with effect of menstrual cycle and stress.

Table 17: Association of severity of acne with perceived effect of stressors

Characteristics	Category	Severity			p-value
		Yes	No	Total	
Effect of menses	No effect	1 (6.67)	14 (93.33)	15 (100)	0.692*
	Worsens	17 (14.53)	100 (85.47)	117 (100)	
	Total	18 (13.64)	114 (86.36)	132 (100)	
Effect of sun	No effect	14 (12.61)	97 (87.39)	111 (100)	0.017

exposure	Worsens	14 (28)	36 (72)	50 (100)	
	Total	28 (17.39)	133 (82.61)	161 (100)	
Effect of stress	No effect	15 (16.85)	74 (83.15)	89 (100)	0.841
	Worsens	13 (18.06)	59 (81.94)	72 (100)	
	Total	28 (17.39)	133 (82.61)	161 (100)	

* Fischer Exact test applied

3.4.6 Association between severity of acne and effect in quality of life

The effect in quality of life was more in severe and very severe grades of acne, as seen by moderate to severe impact in quality of life in 20% of cases with severe acne. However, the association of acne severity was not found to be significant statistically with quality of life.

Table 18: Association between severity of acne and effect in quality of life

Characteristics	Category	Severity			p-value
		Severe/ Very severe	Mild/ Moderate	Total	
Effect in quality of life	No/Mild	13 (15.12)	73 (84.88)	86 (100)	0.415
	Moderate/ Severe	15 (20)	60 (80)	75 (100)	
	Total	28 (17.39)	133 (82.61)	161 (100)	

3.5 Multivariable Analysis

All the associated variables which were significant at 10% significance ($p \leq 0.1$) were analyzed for taking into multivariable analysis. The significantly associated variables were taken for adjustment in multivariable binomial logistic regression using ENTER method. The adjusted ODDs ratio was obtained for the variables, along with the 95% confidence interval for the ODDs. The variables found to be associated were sex, smoking, history of adolescent acne, family history of acne, milk consumption and sun exposure. Two variables viz. milk intake per week, and perceived effect of sun exposure were found to be significantly associated with severity of acne, even after adjusting for the other confounding variables.

Table 19: Multivariable analysis of the factors associated with severity of acne

Characteristics	Category	β -coefficient	P-value	Adjusted ODDs	95% CI of AOR	
					Lower	Upper
Sex	Female	Reference				
	Male	0.803	0.323	2.233	0.454	10.988
Smoking	No	Reference				
	Yes	0.572	0.516	1.771	0.315	9.951
H/o adolescent acne	No	Reference				
	Yes	-0.973	0.063	0.378	0.135	1.056
Family h/o acne	No	Reference				
	Yes	0.707	0.199	2.027	0.690	5.961
Milk intake (days/week)	< 3	Reference				
	≥ 3	1.234	0.008	3.434	1.384	8.524
Sun exposure	No Effect	Reference				

	Worsens	1.066	0.024	2.903	1.151	7.321
Constant		-2.519	0.000	0.081		



Figure 09: Showing different types of lesions

Figure 10: Showing different grades of acne (GAGS)

3.2 Discussion

Acne is chronic pilosebaceous inflammation, one of the most frequent adolescent diseases, it affects 80% of teens. Adult acne is mild to moderate, with inflammatory lesions [24]. The causes of its rise in adulthood are unknown, but smoking and psychological stress can contribute to its clinical manifestation. The majority of patients (52.8%) in our study were aged 25-29, with a mean age of 30.05 ± 4.50 years. This matches earlier research with a mean age of 30.5–35.5 years [25]. Female patients dominated this study (82%), it makes sense as women care more about attractiveness. There were 20 (15.27%) cases of severe to very severe acne in people under 35 and 8 (26.67%) in those over 35. Severe acne was more common in men (34.48%) than women (13.64%). Male acne was statistically more severe than female acne. Of the patients in our study, 31.1% had completed secondary school, 29.2% higher secondary, and 24.8% bachelor's. This explains why educated people care more about appearance. Similar to a previous study, 87.1% of cases reported attending upper secondary school or having a university degree [26]. Most cases (62.7%) were homemakers, mostly 25-year-old women, followed by 50 (31.1%) with other occupations. An earlier study found 45.3% office workers [27], similar studies found a link between AFA and office-related labor, probably due to air conditioning or psychological variables. The body mass index ranged from 17 to 34 kg/m², with a mean of 24.39 ± 3.59 kg/m². Our study found that 64 (39.8%) were pre-obese, 32 (19.9%) were overweight, 48 (29.8%) were normal, and 5 (3.1%) were underweight. Overweight patients (19.4%) had more severe/very severe acne than those with normal or low BMI

(13.2%) [28]. Acne severity did not significantly correlate with BMI. 82 (50.9%) of our study participants developed acne between 25 and 39 years old, and 61 (37.9%) had it for over 5 years. Similar to earlier study, the mean age of onset was 30.5 ± 6.4 years [29]. Severe and very severe acne was more common in instances that started before 35 years old (21.79%) than after 35 years old (13.25%). In 94% of cases, deterioration occurred before menstruation. Menstrual cycle (14.53%), sun exposure (28%), and stress (18.06%) aggravated acne more. Sun exposure was statistically associated with acne severity even after controlling for confounding factors. However, stress and menstrual cycle did not significantly affect acne severity. Most patients (14%) smoked. 41% drank. Other Italian studies found 24.5% of women smoked and 62.3% drank [30]. Smoking and alcohol intake are socially unacceptable, therefore information bias may have underreported them. Smokers (36.36%) and alcohol users (18.18%) had more severe/very severe acne than non-smokers (14.39%) or non-drinkers (16.84%). Smoking was significantly associated with acne severity [31]. The connection between alcohol use and acne severity was not statistically significant. Smoking by 24.8% of individuals was associated with increased rates of severe acne (17.4% vs. 8.0%, $P < 0.05$). Smoking causes non-inflammatory adult female acne by increasing sebum production and decreasing vitamin E [32]. Our investigation found that 123 (76.4%) instances ate fruits more than three days each week. All cases ate veggies daily. Fish consumption was under 3 days per week in all cases. Most patients (115 (71.4%) and 139 (86.3%) ate less than three days of milk and meat per week. Fruit and milk consumption increased acne severity by 21.05% and 32.61%, respectively, compared to 16.26% and 11.3% for those consuming fewer than 3 days per week [33]. Acne severity was not statistically associated with fruit and meat consumers. Our study found 24 (14.9%) cases of acne in parents, 68 (42.2%) in siblings, and 11 (6.8%) in both parents and siblings, which is similar to other studies that found 38.6% to 56.8%. DLQI sections affected symptoms and feelings the most, with a mean value of 2.534 ± 1.66 , followed by daily activities with a mean value of 1.839 ± 1.788 . Adult acne had a moderate effect on quality of life in 57 (35.4%) cases, no effect to small effect in 43 (26.7%) cases, and very large effect in 18 (11.2%). However, a study found that CADL improved quality of life in 48.3% of participants. Scars affected quality of life clinically in 53.2% of subjects [34].

4. CONCLUSIONS

This study was carried out to evaluate the clinico-epidemiological profile of adult acne and quality of their life being affected by it. One hundred and sixty-one (161) patients clinically diagnosed of adult acne attending the outpatient department of Dermatology and Venereology of B.P. Koirala Institute of Health Sciences, Dharan were enrolled in the study. A detailed history with respect to general socio-demographic information (age, sex, race, religion, education, occupation and marital status), information regarding personal habits (smoking and alcohol consumption) pregnancy, menstrual pattern, use of oral contraceptives, history of adolescence acne, history of acne in relatives, dietary patterns, relevant comorbidities and factors aggravating acne (sun exposure and stress) were recorded in preset proforma. Detail examination for site of acne, distribution, type of lesion and grading of acne was done. Adult acne has shown to affect quality of life moderately, with greater effect among females. Severity of acne was found to have significant association with smoking, sun exposure and intake of milk products. This study being an observational study needs careful interpretation of the associated factors. The findings from this study warrants need for interventions targeting for behavioural and dietary modification to reduce the severity of acne, and its impact on quality of life. Further studies considering a control group could better evaluate the factors associated with acne among adult population. Similar studies in other parts of

country could better evaluate the clinical profile and factors associated with adult acne. Behavioural and dietary modification may be helpful regarding prevention of aggravation of acne to some extent.

REFERENCES

- [1] Shah, N., Ali, F., Radhakrishnan, A., Chaudhari, P., Patil, A., & Patil, S. (2021). Clinical and epidemiological characteristics and hormonal profile of adult females with acne vulgaris: a cross sectional study from a tertiary care hospital. *Int J Res Dermatol*, 7(3), 440-4.
- [2] Khan, Noor & Zareef, Uzma & Khan, Hijab & Rehman, Amna & Afridi, Amna & Qadri, Samir & Zulfiqar, Rabia. (2024). Evaluation of minimally invasive oropharyngeal specimens and extraction of nucleic acids for molecular diagnostic analysis. *Zhonghua er bi yan hou tou jing wai ke za zhi = Chinese journal of otorhinolaryngology head and neck surgery*. 55. 1429-1438.
- [3] John Petter (2023). Anti-Depressant Consumption, Patterns, Prevalence, and Risk Considerations among Women in the Fertile Age Range. *Dinkum Journal of Medical Innovations*, 2(03):85-90.
- [4] Riaz, Mariam & Javed, Maham & Bukhari, Saima & Shaheen, Faiza & Khan, Tariq & Khalid, Henna & Zulfiqar, Rabia. (2024). BLOODSTREAM INFECTIONS AND TRENDS OF ANTIMICROBIAL SENSITIVITY PATTERN: A LABORATORY BASED STUDY. *Zhonghua er bi yan hou tou jing wai ke za zhi = Chinese journal of otorhinolaryngology head and neck surgery*. 55. 1421-1428.
- [5] Heng, A. H. S., & Chew, F. T. (2020). Systematic review of the epidemiology of acne vulgaris. *Scientific reports*, 10(1), 5754.
- [6] Zahra, Musarrat & Bukhari, Saima & Khan, Tariq & Zakir, Afsheen & Munshi, Muhammad & Mehnaz, Gul & Zulfiqar, Rabia. (2024). Comparative Analysis Of Incidence Of Non-Opioid Analgesic Self-Medication Practice Among Health Associates. *Journal of Population Therapeutics and Clinical Pharmacology*. 31. 1649-1656. 10.53555/jptcp.v31i4.5980.
- [7] Ayesha Nasir (2023). Common Bacteria Involved in Fascial Space Infection and Antibiotics Sensitivity. *Dinkum Journal of Medical Innovations*, 2(03):97-110.
- [8] Budamakuntla, L., Parasramani, S., Dhoot, D., Deshmukh, G., & Barkate, H. (2020). Acne in Indian population: An epidemiological study evaluating multiple factors. *IP Indian J. Clin. Exp. Dermatol*, 6, 237-242.
- [9] Khanna, K., Krishna, A., & Kumar, A. Clinico-epidemiological profile of acne vulgaris and its relationship with insulin resistance in males vs females: A comparative study.
- [10] Nizam-ul-Haq & Joya Mondal (2023). A Review of the Literature on Nutrition, Dietary Habits, and Dental Hygiene in Elderly Individuals. *Dinkum Journal of Medical Innovations*, 2(11):473-483.
- [11] Munir, Shaouki & Biswas, Anirudha & Shakil, Jamil & Mouri, Sadia & Mostafa, Shekh Mohammad & Estoque, Arevalo & Tantong, Alkauzar & Zulfiqar, Rabia. (2024). COMPARISON OF QUALITY ASSURANCE, EMPATHY, AND BURNOUT IN HEALTHCARE PEOPLE SETTINGS: A DESCRIPTIVE STUDY OF PATIENTS AND HEALTHCARE ASSOCIATES. *Chinese Science Bulletin (Chinese Version)*. 69. 1267-1276.
- [12] Soodan, P. S., Kaur, A., & Soodan, N. (2021). Acne vulgaris clinical profile and its relationship with insulin resistance in males vs. Females: A comparative study. *European Journal of Molecular and Clinical Medicine*, 8(4), 964-970.
- [13] Mutahira, Ayesha & Bukhari, Saima & Uttra, Awais & Saeed, Arooj & Rashid, Salma & Ashhab, Atiq & Tufail, Tabussam & Zulfiqar, Rabia. (2024). INVESTIGATING THE INTERACTION BETWEEN DOPAMINE RECEPTORS AND ANTIBODIES AGAINST GROUP A STREPTOCOCCUS WITH A RANGE OF DIETARY ANTIGENS. *General Medicine*. 26. 1311-1817.
- [14] Alshammrie, F. F., Alshammari, R., Alharbi, R. M., Khan, F. H., & Alshammari, S. K. (2020). Epidemiology of acne vulgaris and its association with lifestyle among adolescents and young adults in Hail, Kingdom of Saudi Arabia: a community-based study. *Cureus*, 12(7).
- [15] Jha, R. R. (2021). Evaluation of clinical profile of acne vulgaris in a tertiary care teaching hospital. *Journal of Datta Meghe Institute of Medical Sciences University*, 16(4), 653-657.
- [16] Nahal Mostak Khan, Soheb Ahmed Robin, Lutfullahil Khahir & Sohail Mahmud (2023). Role of Vitamin C in Development of Age Related Cataract. *Dinkum Journal of Medical Innovations*, 2(12):515-523.
- [17] Tinny, Sejuti Sarker & Shaheen, Faiza & Bukhari, Saima & Khan, Tariq & Mehnaz, Gul & Riaz, Mariam & Zulfiqar, Rabia. (2024). PERSPECTIVE OF PHARMACOLOGISTS AND PATHOLOGISTS REGARDING ARTIFICIAL

- INTELLIGENCE BASED ON DECISION-MAKING DRUG DISCOVERY: A CROSS SECTIONAL STUDY. *Zhonghua yi shi za zhi* (Beijing, China: 1980). 54. 1543-1551.
- [18] Khanday, Zahid & Pantha, Parkash & Pervez, Ayesha & Magdi, Fatma & Mostafa, Mohammad & Hossain, Md. Abul & Tinny, Sejuti Sarker & Zulfiqar, Rabia. (2024). A SYSTEMATIC ANALYSIS OF ROLE OF ARTIFICIAL INTELLIGENCE IN MEDICAL IMAGING: IMPACTS AND THREATS ON RARE DISEASE COMMUNITY. *Kokuritsu Iyakuin Shokuhin Eisei Kenkyūjo hōkoku* = Bulletin of National Institute of Health Sciences. 142. 3627-3637.
 - [19] Imran Mehfooz Khan, Aron Kumar & Pradeep Sahejpal (2023). Extensive Management Medical Incidents Provided to Gallbladder Cancer Using Cholecystectomy Specimen. *Dinkum Journal of Medical Innovations*, 2(04):150-156.
 - [20] Khanday, Zahid & Pantha, Parkash & Pervez, Ayesha & Magdi, Fatma & Mostafa, Mohammad & Hossain, Md. Abul & Tinny, Sejuti Sarker & Zulfiqar, Rabia. (2024). A SYSTEMATIC ANALYSIS OF ROLE OF ARTIFICIAL INTELLIGENCE IN MEDICAL IMAGING: IMPACTS AND THREATS ON RARE DISEASE COMMUNITY. *Kokuritsu Iyakuin Shokuhin Eisei Kenkyūjo hōkoku* = Bulletin of National Institute of Health Sciences. 142. 3627-3637.
 - [21] Kashyap, S., Besra, L., Kar, H. K., & KAR, H. K. (2024). Evaluation of Risk Factors Associated With Adult-Onset Acne in Patients Attending a Tertiary Care Center in East India: A Case-Control Study. *Cureus*, 16(1).
 - [22] Asbin Bikram Bandhari (2023). Alcohol Addiction and its Impacts on Nepalese. *Dinkum Journal of Medical Innovations*, 2(06):236-239.
 - [23] Dione, H., Bammo, M., Gbama, K. K. P., Dieye, S. A., Gueye, N., & Dioussé, P. (2024). Epidemiological, Clinical, Therapeutic, and Progressive aspects of Acne in the Dermatology Department of the Regional Hospital of Thies (SENEGAL): about 1246 cases (2009-2019). *Dermis*, 4(1), 1-7.
 - [24] Anaba, E. L., Oaku, R. I., & Cole-Adeife, M. O. Prospective Comparative Study of the Influence of Gender on the Clinical Profile and Quality of Life in Post Adolescent Acne.
 - [25] Kutlu, Ö., Karadağ, A. S., & Wollina, U. (2023). Acne no adulto versus acne no adolescente: revisão narrativa com foco na epidemiologia e no tratamento. *Anais Brasileiros de Dermatologia*, 98(1), 75-83.
 - [26] Kaleta, K. P., Bogusławska, A., Stefanis, A. J., Kłosowicz, A., Juško, N., Kapińska-Mrowiecka, M., ... & Wojas-Pelc, A. (2020). The Skin as a Mirror of Internal Disease: Comorbidities and Epidemiology of Acne Vulgaris and Adult Female Acne—A Cross-sectional Study and Current State of Knowledge. *Acta Dermatovenerologica Croatica*, 28(3), 133-140.
 - [27] Surekha, A., Sharan, T. R., Keerthi, T., Snehasela, V., Kumari, J. K., & Kumar, M. G. (2021). A CLINICO-EPIDEMOLOGICAL STUDY OF ACNE VULGARIS IN TERTIARY CARE HOSPITAL, SVIMS TIRUPATI.
 - [28] Hadia, R., Tousif, I. M., Kapadia, A., Pillai, S., Rajput, H. S., Joshi, D., ... & Maheshwari, R. Assessing of the Risk Factor & Determine Epidemiology of Acne Vulgaris in Tertiary Care Teaching Hospital.
 - [29] Manivannan, M. (2020). Clinico Epidemiological study of Facial Dermatoses among Adults (Doctoral dissertation, Coimbatore Medical College, Coimbatore).
 - [30] Anaba, E. L., & Oaku, I. R. (2021). Adult female acne: A cross-sectional study of diet, family history, body mass index, and premenstrual flare as risk factors and contributors to severity. *International Journal of Women's Dermatology*, 7(3), 265-269.
 - [31] Ruchiattan, K., Rahardja, J. I., Rezano, A., Hindritiani, R., Sutedia, E., & Gunawan, H. (2020). A five-year clinical acne patients profiles and its management based on Indonesian acne expert guideline in Bandung, Indonesia. *Journal of Pakistan Association of Dermatologists*, 30(2), 229-234.
 - [32] Sundaram, V. S., Gunalan, P., & Elizabeth, S. S. (2020). A study of clinical pattern of acne vulgaris—In a tertiary care hospital in India.
 - [33] Dias da Rocha, M. A., Saint Aroman, M., Mengeaud, V., Carballido, F., Doat, G., Coutinho, A., & Bagatin, E. (2024). Unveiling the Nuances of Adult Female Acne: A Comprehensive Exploration of Epidemiology, Treatment Modalities, Dermocosmetics, and the Menopausal Influence. *International Journal of Women's Health*, 663-678.
 - [34] Dessinioti, C., & Katsambas, A. (2022). Focus: Antimicrobial Resistance: Antibiotics and Antimicrobial Resistance in Acne: Epidemiological Trends and Clinical Practice Considerations. *The Yale Journal of Biology and Medicine*, 95(4), 429.