



**ST.PAUL'S HOSPITAL MILLENNIUM MEDICAL COLLEGE
DEPARTMENT OF DERMATOLOGY & VENEREOLOGY**

**PREVALENCE AND FACTORS ASSOCIATED WITH ACNE
VULGARIS AMONG PATIENTS ATTENDING
DERMATOLOGY OPD AT SPHMMC, ADDIS ABABA,
ETHIOPIA.**

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OPD AT SPHMMC, ADDIS ABABA, ETHIOPIA.

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Declaration

I, the undersigned declare that this thesis is my original work in partial fulfillment of the requirement for speciality certificate in dermatology & venereology. I also declare that it has never been presented in this or any other university and that all resources and materials used in the thesis have been duly acknowledged.

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Acronyms and Abbreviations

AOR	Adjusted Odds Ratio
BMI	Body Mass Index
CI	Confidence Interval
COR	Crude Odds Ratio
GAGS	Global Acne Grading System
G.C	Gregorian Calendar
IGF-1	Insulin-like Growth Factor 1
OPD	Outpatient Department
OR	Odds Ratio
P. acne	Propionibacterium Acnes
PI	Principal Investigator
St	Saint
SPHMMC	Saint Paul's Hospital Millennium Medical College
SPSS	Statistical package for the Social Science
UV Light	Ultraviolet Light
Vs	Versus
WHO	World Health Organization

Abstract

Background: Acne is a chronic inflammatory disease of the pilosebaceous unit of the skin. It is one of the most common skin disorders that affects about 9.4% of the population globally and occurs primarily during adolescence. The pathogenesis of acne appears to be complex and multifactorial. A large number of factors are found to be correlated with the risk of acne, including genetics, lifestyle, environmental, and hormonal factors.

Objective: To determine the Prevalence and associated factors of Acne vulgaris among patients attending Dermatovenereology outpatient department at Saint Paul's Hospital Millennium Medical College, Addis Ababa, Ethiopia, 2023G.C.

Methods: An institutional based cross sectional study was conducted from June, 2023 – November 2023 G.C at dermatology Outpatient Department, St. Paul's hospital millennium medical college, Addis Ababa, Ethiopia. A total of 242 respondents who gave informed consent were recruited using a systematic random sampling technique. Data was collected using a structured interviewer-administered questionnaire and clinical examination by trained dermatology residents. Data entry and analysis were done using Statistical Package for Social Sciences (SPSS) version 26. Descriptive statistics such as frequency and cross-tabulation were calculated to measure the magnitude of selected variables and the prevalence of Acne vulgaris. Binary logistic regression analysis was conducted and factors with a p-value of less than 0.25 on bivariate analysis were further entered into the multivariate analysis. Adjusted Odds Ratio (AOR) with 95% CI was used as a measure of association and p-value less than 0.05 was taken as statistically significant.

Result: A total of 242 individuals participated in this study. The prevalence of acne vulgaris was found to be 17.4 % (95% CI (12.8-22.7)). Multivariable binary logistic regression analysis revealed that adolescent age [AOR=3.414; 95% CI (1.006-11.584)], family history of acne [AOR=5.957; 95% CI (2.295-15.458)] and oily skin type/mixed skin type [AOR=10.356; 95% CI (3.746-28.634)]/ [(AOR=5.296; 95% CI (1.096, 25.585))] were significantly associated with acne vulgaris.

Conclusion: The prevalence of Acne vulgaris was found to be 17.4% in patients attending dermatology OPD at SPHMMC. Adolescent age, positive family history and, oily/mixed skin type were significantly associated with Acne vulgaris,

Keywords: Acne vulgaris, prevalence, risk factor

1. INTRODUCTION

1.1 Background

Human skin is a very important part of an individual's physical appearance, besides its known physiological function. It is necessary in everyday interaction for work or leisure purposes. Conditions that affect the skin may therefore affect an individual's ability to function properly (1).

Acne vulgaris, commonly known as acne is one of the most common skin disorders worldwide, irrespective of all ethnicities and races, affecting approximately 650 million people, or roughly 9.4% of the global population (2). Acne prevalence has been reported to range from 60 to 90% in the majority of studies conducted across different nations, with lower prevalence found in developing countries (3). There could be a variety of reasons for the variation in acne prevalence across nations, including distinct genetic backgrounds, lifestyles, environmental influences, and study methodology(4).

Acne vulgaris is a chronic inflammatory disease of the pilosebaceous unit of the skin, with multifactorial etiologic factors. Although the pathophysiology of acne is thought to be complex, it primarily involves follicular hyperkeratinization, sebaceous hypersecretion due to androgen stimulation, follicular colonization by *Propionibacterium acnes* and immune and inflammatory responses (5). Aside from these factors, the pathophysiology of acne is also thought to be influenced by genetics, a family history of acne, sun exposure, stress, dietary habits, environmental pollution, smoking, female androgen excess, occlusive cosmetics, and occupational exposures(6). However, previous studies investigating the potential link between this risk factors and acne vulgaris have shown controversial results.

Acne is most common during adolescence, impacting about 85% of youths between the ages of 12 and 24 at some point in their lives. It can also develop during infancy, and 3% of men and 12% of women will continue to experience acne well into their 40s(7). Acne vulgaris is more common and severe in men, even though it develops earlier and lasts longer in women(8).

Clinically, it is characterized by pleomorphic eruptions which includes non-inflammatory comedones, papules, pustules, cysts, nodules, and occasionally scars(8,9). It affects different body parts, primarily the face, anterior chest, and upper back, which are areas with a high density of sebaceous glands. The cheeks are the most commonly affected area on the face, followed by the forehead, nose, and chin(8). Its clinical manifestations typically range greatly from mild comedonal acne to severe inflammatory nodulocystic acne(7).

Acne takes several years before going in to spontaneous remission(10). The prognosis of the disease is usually good, but, as a chronic disease, relapses may happen even during treatment(10). Even though acne is considered to be merely a cosmetic issue, it is linked to significant psychological impairment such as low confidence, anxiety, depression, obsessive compulsiveness, self-consciousness, poor self-image and sometimes suicidal ideation in patients compared to those of the same age without acne(8).

Given that acne vulgaris is widely acknowledged to be a chronic, multifactorial skin condition that can have negative effect on self-esteem and which can last into adulthood, dermatologist are always searching for additional therapies and lifestyle modifications that can improve the quality of life for those who suffer from acne(3).

Limited studies have been done on Acne Vulgaris in our country and only few associated factors has been assessed, necessitating the need for this issue to be addressed in order to achieve a better understanding of the disease, its current prevalence and associated factors. Therefore, the aim of this study was to estimate the prevalence of acne and its associated factors among patients attending dermatology OPD at SPHMMC, Addis Ababa, Ethiopia.

1.2 Statement of the Problem

In 2010, the prevalence of acne worldwide was 9.38%, making it the eighth most common disease in the world, according to a systematic analysis conducted for the Global Burden of Disease Study. From 2006 to 2016, the prevalence of acne increased by 5.1%(11). Acne vulgaris affects about 85% of teenagers and two-thirds of adults who are 18 years of age and older(12). But the prevalence of acne in adults and adolescents varies throughout time and across different nations. It has been suggested that varied lifestyle may have an impact on the prevalence of acne(13).

The prevalence of acne in industrialized countries ranges from 30% to 100% depending on age, sex and ethnicity, while it is lower in developing countries(14).The proportion of Acne in hospital based studies in Africa have been reported to be 4.6% in Ghana, 6.7% in Nigeria, 17.5% in South Africa and 4.5% between the age 10 and 16 years old in Ethiopia(7). Along this line, a few studies reported that acne was virtually absent in non-Westernized countries in those living and eating in their traditional manner, whereas acne began to appear when these populations changed their eating pattern to those similar to Western populations(13).

When there is no systemic involvement, skin disorders are not life-threatening; yet, they represent the fourth leading cause of disability globally(15). Even while acne vulgaris is not usually fatal or physically debilitating, it can have a major influence on a patient's quality of life due to its cosmetic, psychological, and social effects(16). Of all skin diseases, Acne Vulgaris has been identified as the second leading cause of disability-adjusted life years after dermatitis (atopic, contact, and seborrheic dermatitis), causing loss of productivity for patients and caregivers that are equal to the productivity cost of skin cancer(16).

Acne patients are mostly distressed due to the fact that it mainly affects the face, which is the first thing seen on coming in contact with another human, being easily visible and constantly present in everyday life(7). As a result, emotions of shame, dissatisfaction with one's appearance, and dread of being thought to be ugly, ill, unclean, and worthless are frequently associated with it. As a result, those affected by acne are more likely to avoid engaging in social activities(17). Furthermore, this social dysfunction and

discosmetic dermatosis can easily cause inferiority in young men and women, even influencing their ability to find work and get married. (11). According to the study in China, 30.8% acne patients reported that acne had a negative impact on their quality of life(11). The teenage age range, which is so severely impacted, is especially vulnerable to these psychological impacts(15).

Moreover, acne patients are at increased risk of mental disorders, including anxiety, depression, suicide and other forms of emotional trauma(11). In one epidemiologic study by Yentzer et al., 8.8% of patients with acne reported depression, with women suffering from depression twice as often as men (10.6% vs. 5.3%)(6). More severely, the subsequent adverse psychological effects could perpetuate or aggravate the skin disease, resulting in a vicious circle(18). Acne patients additionally experience the associated financial burden due to the condition's high recurrence rate(11).

The incidence rate of acne in developing countries including Ethiopia was assumed to be different from that in western society as a result of the race, life styles, dietary habits and living conditions. However, with the improvement of living standards and concomitant changes in life style (westernization) the incidence of acne has increased in recent years. Therefore, this study is conducted to better understand the prevalence of acne and evaluate its association with age, sex, body mass index, family history of acne, nutritional habits, smoking and alcohol consumption, skin type and cosmetic use, of which some were not assessed in studies done in our country previously.

1.3 Significance of the Study

Acne is one of the most common reasons for dermatological visits and has been shown to have a significant impact on psychosocial health and quality of life of affected patients(19). Many studies have been done to assess the prevalence of acne and its risk factors in different countries of the world, however, due to different genetic background, lifestyle and environmental factors, the prevalence and the risk factors of acne were inconsistent. Moreover, previous studies investigating the potential link between the risk factors and acne vulgaris have shown controversial results.

Limited studies have been done on acne in our country investigating the epidemiology and the disease profile thoroughly, the recent one is the study done in ayder referral hospital, Mekelle, northern Ethiopia in 2014. Similar to other developing countries, with the on-going improvement in the life standard of the country and concomitant changes in lifestyle of the population, the incidence of acne may have increased in recent years. Therefore there is a need for this issue to be addressed in order to achieve a better, up to date and region specific understanding of this disease prevalence and risk factors, thereby leading to a positive patient outcome.

This study is also important for quantifying the impact of acne and for planning methods and resources needed for adequate acne control such as number of dermatologists and drugs used in the treatment of acne. Additionally, there is a need to address this issue in order to design recommendations for the general public to minimize the incidence and consequences of acne vulgaris by simple lifestyle and environmental modification. These will assist dermatologist in providing patients with well substantiated recommendations, to dispel any misconceptions/myths and awareness could be created regarding the prevention of these risk factors through extensive health education.

The study will also provide useful baseline information for further studies on Acne Vulgaris.

2. LITERATURE REVIEW

2.1 Overview of Acne Vulgaris

The term acne is derived from the Greek word "acme" and has the meaning of a skin eruption, and "Vulgaris" means "common"(15). Acne vulgaris is a very common physiological malady of adolescents but it is better regarded as a disease due to its inflammatory component and the disfigurements it produces on the socially and psychologically most important body region(20). Acne vulgaris is a chronic inflammatory, self-limited disease of pilosebaceous unit. Pilosebaceous unit is comprised of the hair follicle and sebaceous gland, which produces and secretes sebum onto the skin surface(4).

Although some patients present with neonatal or infantile acne in their first year of life, acne vulgaris often first appears in adolescence and usually resolves by the middle of their twenties(20). For females, the average age at which acne appears is 11 years, while for males it is 12 years(15). Although acne vulgaris appears earlier and lasts longer in females than in males, it affects males more frequently and more severely, possibly due to androgen activity(8). It's often believed that acne only affects teenagers, yet a substantial number of patients either develop new acne or continue to have acne after their teenage years(9). When the disease is present after the age of 25 years, it is usually named adult acne (AA), which encompasses 2 variants: "persistent" acne which continues after adolescence, while "late onset" acne starts after 25 years of age(21). Acne vulgaris risk drops to 1% for men and 5% for women over the age of 40(21).

Although acne's primary cause is uncertain, it is considered to be a multifactorial condition that originates in the sebaceous follicles. The four main pathogenic factors determining acne development are: increased (Seborrhoea) and altered sebum production under androgen control, alteration of follicular keratinization that leads to Comedon formation (comedogenesis), follicular colonization by propionibacterium acnes and complex inflammatory mechanisms that involve both innate and acquired immunity (20).

Thus far, research has indicated that the prevalence of acne varies according to ethnicity, region, and throughout time. This has led to the conclusion that a variety of factors, including environmental factors, diet, smoking, and hygienic practices such as the

use of cosmetics, may be important in the pathogenesis of acne in addition to hormonal and genetic causes(3).

It is clinically characterized by comedones, papules, pustules, less frequently by nodules, deep pustules, or pseudocysts(22). The sebaceous-rich anatomic regions of the face, shoulders, mid-chest, and upper back have the highest concentration of acne lesions(20).

The most common complications seen in acne vulgaris patients are post-inflammatory hyperpigmentation and scarring. Post inflammatory pigmentation is more common in patients with skin of color(23). There is direct relationship between scarring and duration of the disease(8). Likewise the deeper the inflammatory process, the more likely it will produce permanent scarring(20). The two basic scar types – depending on whether there is a net loss or gain of collagen – are atrophic (majority of scars) which are small pits to deep fissures and hypertrophic scars and keloids (minority). Even with appropriate treatment scarring leaves a permanent disfigurement(24).

Acne can appear in a wide variety of clinical forms depending on the type, number, and severity of the predominant lesions, and be categorised into different severity and scarring grades(25). To date, there is no single universally agreed-upon grading scheme for acne, and the grading systems employed in clinical trials vary greatly(6). The system most commonly used in research is the Global Acne Grading System (GAGS) which is developed by Doshi et al for the clinical evaluation of acne severity (19).

There are numerous treatment modalities available for the management of acne vulgaris. This include numerous over-the-counter and prescription topical and systemic treatments such as antibiotics such as tetracycline, erythromycin, and clindamycin, which are administered topically or systemically, benzoyl peroxide, azelaic acid or retinoids(2).

2.2 Prevalence of Acne Vulgaris

Acne vulgaris is one of the most prevalent chronic dermatological diseases particularly among adolescents. According to Global Burden of Disease Study, Acne vulgaris is the eighth most common skin disease worldwide, estimating a global prevalence of acne (for all ages) of 9.38%(25). However, the prevalence of acne differs throughout different age groups and nations(14).

Most studies have shown a prevalence of acne between 60-90%(3). The prevalence of acne in developed countries ranges from 30% to 100% depending on age, sex and ethnicity, while it is lower in developing countries, and is very low in certain ethnic groups(14).

J.Szepietowski, D.Tennstedt, S.Veraldi, et al found Acne prevalence among adolescents/young adults from 7 European countries to be 57.8%.The prevalence rate per country ranged from 42.2% in Poland to 73.5% in the Czech and Slovak Republics(26). D.Li, Q.Chen, Y.Liu et al on their systematic review and meta-analysis of prevalence of acne in Mainland China, the overall pooled prevalence of acne was 39.2%(27). W,Al-Kubaisy, N.Abdullah, S.Kahn, et.al found prevalence of acne among university students in Syria was 34.7% and , there was a significantly higher rate of acne among male students than that among females (42.9% versus 23.6%). F. Alshammrie, R. Alshammari, Rasha et.al reported prevalence of acne to be 65% among adolescents and young adults in Hail, Saudi Arabia(16).A literature review of 11 cross-sectional studies of different age groups between 6 and 25 years in several South East Asian countries showed Acne Vulgaris prevalence between 9.8 and 91.3%(28).

The prevalence of acne is reported to be low in developing countries of Africa(27).The lower prevalence of acne in the developing world has been associated to diets with low glycemic index. However, recent reports suggest that with the increasing westernization in the developing world there might be an increase in prevalence in the developing world(29).

E.Okoro, A.Ogunbiyi, A.George et.al, found the prevalence of acne among adolescents in Ibadan, south-west Nigeria was 64.4%, of whom 88.6% were classified as having mild acne and 11.4% as having moderate acne(29). On 2017 M.Abu, Mohammed, E.Nada, M.Moustafa, et.al on their study among secondary school-aged adolescents in

Sohag Province, Upper Egypt found the overall prevalence of acne vulgaris was 33.5%(22). S.Kiprono and G. Wamburu found the prevalence of acne in general population of rural western Kenya to be 11.2%(23). Reports from other African countries showed a prevalence of 59.8% in Cameroon and 12.9% in Ghana. Only inflammatory lesions were assessed in the Ghanaian study, which may explain the low prevalence(29). Hospital based study conducted in Mekelle, northern Ethiopia, showed the magnitude of acne to be 19.4%.(7).

This substantial differences in the prevalence of AV in different countries, may reflect a genuine difference between geographical settings, it could be due to methodological differences or due to the fact that different studies targeted different study groups (28).

2.3 Factors Associated With Acne Vulgaris

As one of the highly recurrent chronic diseases, acne to a large extent is affected by the relevant demographic and sociological factors, including physiological factors, lifestyle and psychological factors(11). A study done by Ballanger et al. found a strong association of causation of acne vulgaris to both genetic and environmental elements(16).

2.3.1 Socio-demographic Factors

There are differences in endocrine levels between the genders, resulting in differences in the prevalence of acne. The epidemiological survey of acne among undergraduates in the North East China showed that the prevalence of acne to be 52.74% in males and 49.65% in females. An epidemiology in Singapore showed there were more males than females suffering from adolescence acne (61.3 vs. 38.8%) and more females suffering from post-adolescence acne (69.0 vs. 31.0%) (23). The above studies indicated that more males than females suffered from acne during adolescence and more females than males suffered from acne during post-adolescence(11). But then some other studies reported different results. One Indian study reported almost equal prevalence of acne between male (66.2%) and female students (66.9%). A Portuguese study by Goncalves et al. reported that male medical students (58.0%) had a lower prevalence of acne than females (64.2%). Similarly; a Saudi Arabian study showed that only 34.0% of males had acne compared to 61.0% of female acne sufferers(17).

The epidemiology of acne continues to evolve with changes in hormone levels that vary with age. From the prevalence of acne among Chinese adolescents, it found increased age was related to higher prevalence and severity of acne vulgaris: 15.6%, 44.9%, and 70.4% for 10, 13, and 16 years old. Another European study showed the prevalence of acne was highest at the age of 15–17 and decreased with age(11). These studies show that acne to be more common during adolescence. Y.Say, A.Heng, K.Reginald et al found the risk for acne was significantly higher in those aged 20–24 relative to those above 24 years(25). Similarly highly significant association was found between acne occurrence and age between 21-25 years in a study done in Hail , Kingdom of Saudi Arabia(16).

Relatively few studies considered other demographic factors. A study done in Mekelle, Ethiopia found being never married was associated with acne vulgaris(7). Other Studies also found that marriage were protective for acne while working in an office was a risk factor for acne(30).

2.3.2 Genetic/Physiologic Factors

In a large twin study with 458 homozygous and 1099 heterozygous twins, 81% of the disease variance could be attributed to genetic causes and only 19% to environmental factors(24). Another study on twin models in the UK found that 81% acne variants were caused by genetics and family history, proving that acne have a significant genetic effect(11). A.Heng , Y.Say, Y.Sio et.al found positive familial history of acne was strongly associated with an increased risk for acne presentation, Acne was more frequently observed in individuals whose mother, father, or sibling had acne history compared to those without; higher odds were seen for paternal history than maternal or sibling history(4). Another study by Y.Say, A.Heng, K.Reginald et al found positive familial history of acne was strongly associated with increased odds for acne presentation, even after controlling for age and gender. It reported having only one parent with acne increased the odds of acne to 3.663, while having both parents with acne increased the odds of acne to 3.509(25). Systematic review of the epidemiology of acne vulgaris by A.Heng and F.Chew, also found pooled odds ratio of 2.91 suggesting that family history in parents is associated with an increased risk of acne presentation(30). J.Szepietowski, D,Tennstedt, S.Veraldi, et al found a history of acne in one parent was associated with a 2.7- to threefold increased risk of having acne, almost eightfold increased risk if both parents had acne(26).

Overweight/Obesity

There is a significant relationship between the growing prevalence of obesity and chronic diseases including acne vulgaris. Increased secretion of the insulin-like growth factors-1 (IGF-1) in the body and peripheral hyperandrogenism, which may lead to increased sebum production and are possible mechanisms by which obesity affects the occurrence of acne(11).

Several studies demonstrate being overweight and obesity (Body Mass Index, BMI ≥ 25 kg/m²) were positively correlated with an increased risk of acne(11). A study in Kingdom of Saudi Arabia found there was significant association between occurrence of acne and high BMI(16). In Norway, overweight/obesity was associated with Acne Vulgaris in girls but not in boys(28). A.Heng , Y.Say, Y.Sio et.al also found higher BMI was associated with acne presentation, with underweight BMI as a protective factor for acne(4).

Conversely, a study conducted in Taiwan investigating the impact of obesity on cutaneous manifestations of clinical hyperandrogenism, found that obese women had less acne than non-obese subjects(16).A study done in Pakistan in 2021 found no significant association of acne with BMI(31).

Skin type

An individual's skin type (for example oily, mixed or dry skin) can be classified according to their skin sebum level(30). Excessive sebum secretion is characterized by oily or mixed skin. Many studies found the sebum level of face was more in population with acne than without acne. (11). I.Imamzai, R.Zwaak, M.Rahemi et al showed that skin type had significant effect on acne with the odds of getting acne increases by a factor of 8.81 for oily skin as compared to dry skin type (32).P.Wang, H.Wang,H.Ding et al also found subjects with oily skin or mixed type skin were more prone to have acne(18).Another study done in Saudi Arabia also showed highly significant association between oily skin and acne(16).

Menstrual cycle

Hormonal factors also play a role in acne development, but few studies have been done to analyse the role of menstrual history on the risk of acne. F. Alshammrie, R. Alshammari, Rasha et.al found significant association between menstrual disturbance and acne(16).In addition, Wei et al. indicated dysmenorrhea was a risk factor to the acne suffers(11). P.Wang, H.Wang,H.Ding et al also found females with menstrual disorder and hypertrichosis were more prone to have acne(18). In 2019 F.Ali also found that acne vulgaris was common in those females who had disturbed menstrual cycle(33). Conversely, a study conducted in Italy reported no relationship between menstrual pattern and acne. Also, a large scale twins study conducted in the United Kingdom showed no relationship between acne and reproductive or hormonal potential risk factors(16).

2.3.3 Lifestyle

Diet

Since early 1900s, the association between acne and dietary habits has been questioned in the literature. Literature from various parts of the world showed enough epidemiological links to consider the effect of diet on acne(16). According with the investigations performed to date, the most incriminated food categories are milk and dairy products, dietary fats and sweets, or generally speaking high glycemic load foods(3).

Consumption of high-glycemic food items and milk are hypothesized to increase the levels of insulin and serum insulin growth factor-1, which promote comedogenesis, sebaceous lipogenesis, follicular inflammation, and androgenic stimulation, thereby inducing or aggravating the occurrence of acne(28). In addition, acne can be caused by greasy, fatty foods, due to the fact that the release of free fatty acids by triglycerides under the action of *P. acnes* could promote the development of acne(11).

Ismail, Manaf and Azizan found that drinking milk on at least once per week was linked to increased odds of acne to 3.99 relative to those who drank milk less than once per week(30). Similarly a meta-analysis review found that the intake of any amount of dairy in general or any kind of milk, regardless of the fat content (full-fat, whole, low-fat, skim) was linked to increased odds of acne, suggesting that dairy and milk intake are likely to influence acne presentation(30). Conversely S.Al Hussein H. Al Hussein C.Vari et al showed that dairy products (milk, yoghurt and cheese) were not risk factors for acne occurrence while excessive intake of sweets, carbonated drinks, dietary fats from processed meat, and white bread were considered as risk factors for acne occurrence(3). J.Szepietowski, D.Tennstedt, S.Veraldi, et al found Consumption of chocolate increased the probability of having acne by up to 30%.

A.Heng , Y.Say, Y.Sio et.al found no significant association with acne presentation and dietary habits (like meat, dairy, fruits, vegetables, fast food, probiotic consumption)(4).

Smoking

The relationship between acne and smoking remains controversial. Smoking can lead to adverse effects on the skin due to alterations in the skin microcirculation, keratinocytes, and collagen and elastin synthesis. It could cause alteration in sebum

composition through decreased antioxidants(16). Several epidemiologic studies found that the prevalence of acne was significantly higher in active smokers than ex-smokers or those who had never smoked. The study of Schafer et al. showed acne to be more frequent and severe among smokers, and to follow a dose-dependent association(24). Al Hussein et al. also reported that smoking was a risk factor for acne, increasing the odds of acne to 2.859(30). However, other studies found that people who smoked regularly showed a significantly lower prevalence of severe acne than non-smokers and some have found no relationship (11). A survey study done in France found that smoking more than 10 cigarettes per day was independently associated with a reduced probability of having self-reported acne(26). Another study by Klaz et al. found active smokers had a significantly lower prevalence of severe acne with an inverse dose-dependent association(24). A.Heng , Y.Say, Y.Sio et.al found no significant association with acne presentation and smoking(4).

UV radiation

UV radiation may enhance the comedogenicity of sebum(20). Sun exposure played a significant role in the incidence of acne. A survey of acne patients in India showed that 26.4% of them developed skin lesions after exposure to sunlight and seasonal variation was observed in 44.5% patients exacerbated, because of increased amount of sunshine exposure in summer months. Dreno et al. found acne was significantly more frequent in individuals with moderate or intensive sun exposure due to their work or daily activities(11).

Cosmetics

Chinese studies found cosmetic make-up use was a risk factor of acne. The reason was because improper skin care practices (such as essential oils or too oily substrates, makeup, excessive cleansing of the skin and soaps with pH 8.0) can modify skin barrier function and skin sebum areas, especially the microbiome balance, thereby activating innate immunity to trigger inflammation(11). Various cosmetics implicated in acne included sunscreens, fairness cream, foundation, and facials. It has been historically believed that low-grade persistent acne in females could occur majorly due to cosmetics use. I.Imamzai, R.Zwaak, M.Rahemi et al showed that cosmetic used and frequency of application of cosmetics had significant effect on acne with the odds of getting acne increases by a factor of 16.419 if anyone use any type of cosmetic, and the odds increase by 13.789 cosmetics use is frequent as compared to none/occasional use of cosmetics. Another study by T.Alanazi, W.Alajroush et al found individuals who used cosmetic

products occasionally reported acne less frequently than participants who used it almost on a daily basis (34). Similarly, the Dumont-Wallon study also found cosmetic use as an important factor in adult acne pathogenesis(35).E.Bogino, M.G.Kebede et.al also found cosmetics use was significantly associated with acne(7).

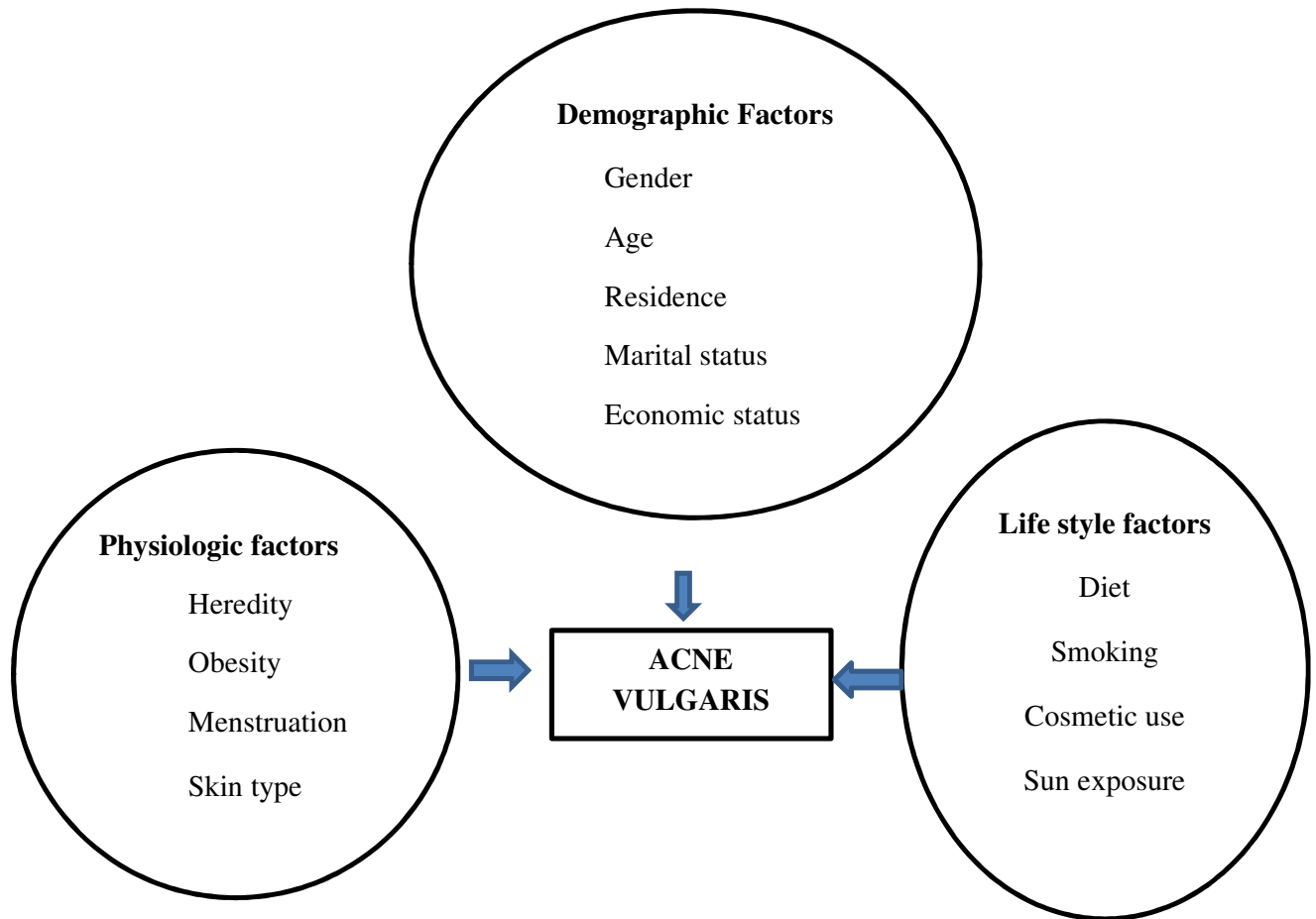


Figure 1: Conceptual Framework on factors associated with acne Vulgaris(11).

3. OBJECTIVES

3.1 General objective

- To determine the prevalence of acne vulgaris and associated factors among patients attending dermatology OPD, SPHMMC Addis Ababa Ethiopia, 2023G.C.

3.2 Specific objectives

The specific objectives of the study are:-

- To determine the prevalence Acne vulgaris among patients attending dermatology OPD, SPHMMC, Addis Ababa Ethiopia, 2023G.C.
- To identify associated factors of Acne vulgaris among patients attending dermatology OPD, SPHMMC, Addis Ababa Ethiopia, 2023G.C.

4. METHODS AND MATERIALS

4.1 Study Design

This was an institution based cross-sectional study to assess the prevalence and factors associated with acne vulgaris among patients attending St. Paulo's Hospital Millennium Medical College.

4.2 Study Area and Period

This study was conducted in dermatology OPD of SPHMMC, which is one of the referral hospitals in Addis Ababa under the Ethiopian Federal Ministry of Health (FMOH). The hospital is located in gulale subcity in Addis Ababa, which is the capital of Ethiopia. St Paul hospital was established with the intent to help the poor people who could not afford medical expenses. It was inaugurated in 1947 furnished with 250 beds initially at Autobis Tera. In 1968/69 new hospital buildings were constructed in the Gulele area, its present site. The hospital had the capacity to admit 400 inpatients and 300 outpatients. During that time the hospital consisted of 9 medical doctors and 18 nurses. Now it is the second largest public hospital in the country. The college has more than 2500 clinical academic and admin staff. The inpatient capacity is 700 beds, more than 2000 outpatient and emergency clients have been visiting the college. Currently the college is established with the mission to provide comprehensive health care services, teach high quality medical education, meet the needs of the communities and serve through advanced and affordable health care services.

Dermatovenerology Department was established in 2000 E.C. currently the department has 08 Dermatovenerologists, 01 Dermatopathologist, 01 Dermatosurgeon, 15 dermatology residents and six nurses. Around 10,000 patients were served in 2014 E.C, and currently 50 to 60 patients attend the OPD daily.

Data was collected from June, 2023 – November, 2023.

4.3 Source Population

The source population included all patients who were visiting dermatology OPD at SPHMMC in 2023G.C.

4.4 Study Population

The study population included all patients who were attending Dermatology OPD at SPHMMC during the study period.

4.5 Sample Size

4.5.1 Sample size for the first objective (Prevalence of Acne Vulgaris)

The sample size for the prevalence of Acne Vulgaris was calculated using formula for a single population proportion considering the following assumptions:

A 95% confidence level, margin of error (0.05) and $p=19.4\%$ (from previous study done at Ayder Hospital)(7).

$$n = \left(\frac{Z_{\alpha/2}}{d} \right)^2 p (1-p) \quad \text{where:-}$$

- n = is calculated sample size
- $Z_{\alpha/2}$ = Z-value for a 95% confidence level which is 1.96
- p = p value was taken 19.4%
- d^2 = marginal error [5%]

Therefore, the formula yields 240 sample sizes but the above sample was going to be taken from a total population of 2448 patients (estimated from previous 6 months record), which is less than 10,000 so correction formula was used

$$nf = \frac{no}{1 + \frac{no}{N}}$$

Where

nf = final sample size

no = initial sample size which is 240

N = total population which is 2448

These resulted in a sample size of 220. By adding 10% (22 patients) for non-respondent the total sample size was 242.

4.5.2. Sample size for the second objective (associated factors of Acne Vulgaris).

The sample size for the associated factors was calculated using two population proportion formulas by using Epi Info Version 7.2.4.0 software. From previous study done at Ayder Hospital family history of acne, cosmetics use and being never married were significantly associated with acne Vulgaris(7).

Table 1: Summary of sample size calculation for associated factors with Acne Vulgaris

Variables					
	P1	P2	power	CI	Sample size
Family history of acne	65.5%	15.8%	80%	95%	38
Cosmetics use	57.1%	15.8%	80%	95%	50
Marital status	26.3%	8.3%	80%	95%	156

P1: proportion of Acne Vulgaris among exposed; P2: proportion of Acne Vulgaris among non-exposed; CI: confidence interval

However, the sample size calculated using formula for a single population proportion had the highest sample size which is 242 therefore the final sample that was included in this study was 242 patients.

4.6 Sampling Procedure

Systematic random sampling was employed to select representative sample participants from patients attending dermatology OPD during the study period. An average of 2448 patients whose age is from 10-40 attends dermatology OPD on 06 months period (estimated from previous month's record). The sample size calculated was 242, so the sampling fraction (k) was: $2448/242 = 10$. The number of the first patient (from 1 to 10) to be included in the sample was chosen by lottery method (random start) then every tenth patient was included in the sample.

4.7 Variables of the study

4.7.1 Dependent variable

- Presence of Acne vulgaris (Yes or No)

4.7.2 Independent variable

- Socio demographic characters: Age, Sex, Marital status, residence, occupation, educational status, monthly income.
- Genetic/Physiologic factors; family history of acne (heredity), menstrual irregularity, overweight/obesity, skin type
- Lifestyle: smoking, dietary factors, cosmetic make-up use, UV exposure

4.8 Eligibility

4.8.1 Inclusion criteria

All patients with in the age group of 10-40years and who visits dermatology OPD at SPHMMC during study period and who gave consent for participation in the study were included.

4.8.2 Exclusion criteria

- Drug-induced and other Acneiform eruptions
- Psychological or physical conditions that prohibits understanding the nature of the study.

4.9 Operational Definitions

- ❖ Acne Vulgaris was diagnosed clinically and Global acne grading scale (GAGS) was used to grade acne or evaluates acne severity (19).

Location	Factor
Forehead	2
Right cheek	2
Left cheek	2
Nose	1
Chin	1
Chest and upper back	3

- Each type of lesion is given a grade depending on severity: no lesions = 0, comedones = 1, papules = 2, pustules = 3 and nodules = 4.
- The score for each area (Local score) is calculated using the formula: Local score = Factor × Grade (0-4).
- The global score is the sum of local scores, and acne severity was graded using the global score. A score of 1-18 is considered mild; 19-30, moderate; 31-38, severe; and ≥ 39 , very severe.
- ❖ **Irregular Menstrual cycle:** cycle length variance greater than 9 days for females age 18 to 25 and greater than 7 days for females age 26 to 41.
- ❖ **Sleep duration** is categorized in to three categories based on National Sleep Foundation recommendation of sleep time as follows:
 - Short sleep duration: Sleeping less than seven hour of sleep per night
 - Normal (Optimal) sleep duration : Sleeping between seven to nine hour of sleep per night
 - Long sleep duration : Sleeping more than nine hour of sleep per night

❖ **Skin type** (according to the American Academy of Dermatology (AAD) skin type classification)

- Dry Skin Type: appear dull, rough and even scaly, with almost invisible pores, feels tight/ less elasticity, red patches and more visible lines.
- Oily skin type: shiny complexion/feels greasy, enlarged pores, tend to have less wrinkling
- Normal skin type: feels neither too dry nor too oily/not scaly or greasy, smooth skin texture and barely visible pores.
- Mixed/combination skin type: skin that is dry or normal over the cheeks and oily in the T-zone (nose, forehead, and chin).

❖ **Smoking**

- A current smoker: individual who smoked at the time of the study or had stopped smoking in less than 6 month.
- Ex-smoker: individual who smoked previously but stopped smoking for more than 6 month.
- A non-smoker: individuals who have never used cigarette.

4.10 Data Collection Procedures (Instrument, Personnel)

Recruitment of participants into the study was done in the OPD. The participants who met the inclusion criteria and consented to participate in the study were enrolled after signing the consent forms. Trained data collectors (dermatology residents) collected data under the supervision of the principal Investigator. Data was collected using a Validated and structured interviewer administered questionnaire that is adopted from Y.Say, A.Heng, K.Reginald et.al(25) and F.Alshammrie, R.Alshammari et.al(16) based on objectives of the study and by doing clinical examination. The first section of the questionnaire assessed socio-demographic data and further sections assessed other factors that may play a role in acne development including family history of acne, smoking behaviour, use of cosmetic products, body mass index (BMI), menstrual irregularity, skin type and the weekly intake of certain food categories.

Clinical examination was done by dermatology resident to assess the presence or absence of acne, distribution (face, trunk or both) and its characteristics: clinical form (comedonal, papular-pustular or nodular-cystic) and severity based on GAGS (mild, moderate or severe) and also presence of post-acne scarring and hyperpigmentation.

Weight and height was measured in a standardized manner and each patient's BMI (kg/m²) was calculated as weight (kg) divided by height (m) squared. The World Health Organization reference range for BMI was used (underweight: <18.5; normal: 18.5–24.9; overweight: ≥25; obese: ≥30 kg/m²).

4.11 Data quality control measures

To ensure data quality, the questions of structured interview were designed properly and the English version questionnaire was translated in to local language, Amharic and back translated in to English by translators fluent in both languages. Training was given to the data collectors about data collection methods, how to take informed consent, how to approach participants and ethical procedure before the actual data collection. To ensure the validity and reliability of the data collection tool the questionnaire was pre-tested on 5% of sample size on randomly selected individuals and these individuals did not participate in the main study. During the pre-test, the questionnaire was assessed for its clarity of the questions, reliability and sensitivity of the subject matter, the accuracy of responses and any ambiguous or lengthy questions were identified, time required was estimated and some modifications were made based on the findings.

During the actual data collection on daily basis, collected information was checked out for the completeness, accuracy and clarity by primary investigator. And possible errors were returned to the collectors for correction. Data clean up and cross checking was done before analysis.

4.12 Data Processing and Analysis

The completed questionnaires was manually checked for completeness and consistency, then coded and entered into Statistical Package for Social Sciences (SPSS) version 26 for analysis. After data entry was completed, data cleaning was performed by running frequencies of each variable to check for accuracy, outliers and consistency. All characteristics were summarized descriptively, for continuous variables; the summary statistics of mean, standard deviation (SD) was used and for categorical data, the number and percentage was used in the data summaries. Descriptive statistics was computed to determine the prevalence of Acne. Bivariable analysis was carried out to determine the association between the independent factors and the presence of acne. Variables with p-value less than 0.25 were taken to multivariable analysis to identify independent factors significantly associated with the presence of acne. The strength of statistical association

was measured by adjusted odds ratios and 95% confidence intervals. The significance was declared at $P < 0.05$. Finally, the results of the findings are presented using text, graphs and tables.

4.13 Ethical Considerations

Ethical approval was requested from SPHMMC and formal letter of permission was obtained. Written consent/Assent was obtained from each participant after the objective of the study, the benefits and risks of the study was explained for them in a language they comprehended. For this one page of information sheet and consent/Assent paper was attached to the cover page of each questionnaire. The right of respondents to withdraw from the study or not to participate at all was explained and respected. In addition to consenting, individual participants was informed of their anonymous data use. For strict confidentiality, none of the participants' identification (name, house number, phone number) was recorded on the questionnaires, on account that all questionnaires were separately coded. Only those patients who fully understood the objectives of the study and accepted to participate were recruited into the study.

4.14 Dissemination of Results

After conducting the research, the finding will be presented during Research defence. The result of this study will also be submitted to SPHMMC department of Dermatovenereology. Moreover, efforts will be made to publish the findings of the study and disseminated through journals and scientific publication.

5. RESULT

5.1 Socio-Demographic Characteristics of the Study Population

A total of 242 participants were included in the study with 100% of response rate. Among the participants (n=242), 146 (60.3%) were females. The median age of respondents was 24 years, and most 115(47.5%) of the study participants were at the age group of 25-40 years, followed by age group 10-19 which is 83(34.3%). Most 105(43.4%) of the study participants attended up to secondary school, while only 22(9.1%) of the respondents did not attend formal education. Majority 181(74.8%) of the respondents were urban residents and 163(67.4%) of the participants were single. Students 89(36.8%) constitute the largest occupational status followed by government or private sector employment 39(16%). Nearly half of the participants, 109 (45%) had an average monthly income of less than 3000 Ethiopian Birr (Table2).

Table 2 Socio-demographic characteristics of respondents at dermatology OPD SPHMMC, Addis Ababa, Ethiopia, 2023

Variable	Category	Frequency(n=242)	Percentage (%)
Age	10-19	83	34.3
	20-24	44	18.2
	25-40	115	47.5
Sex	Female	146	60.3
	Male	96	39.7
Residence	Urban	181	74.8
	Rural	61	25.2
Level of education	No formal education	22	9.1
	Primary	65	26.9
	Secondary	105	43.4
	College/university	50	20.7
Marital status	Single	163	67.4
	Married	69	28.5
	Divorced/ Widowed	10	4.1
Occupation	Student	89	36.8
	Housewife	34	14.0
	Private business	30	12.4

	Employed	39	16.1
	Casual labourer	10	4.1
	Farmer	8	3.3
	not working	32	13.2
	currently		
Monthly income	<3,000	109	45.0
	3001-4500	86	35.5
	>4500	47	19.4

5.2. Prevalence of Acne Vulgaris

The prevalence of Acne Vulgaris among patients attending dermatology OPD at SPHMMC was found to be 17.4 % (95% CI=12.8-22.7) (Figure 2). Out of acne cases observed female accounts 26 (61.9%) and the majority 21(50%) of acne occurs in the age group of 10-19 while 13(31%) were in the age group 25-40 (adult acne).

The mean age ($\pm$ SD) of individuals with acne was (20.74 $\pm$ 4) years and the mean age ($\pm$ SD) at acne onset was 17.38($\pm$ 2.749) years. The mean age at onset of acne was higher in females (18 $\pm$ 3.124 years) than in males (16.38 $\pm$ 1.268 years). Majority 36(85.7%) of patients with acne were urban residents and 35(83.3 %) were single and 19(45.2%) were students.

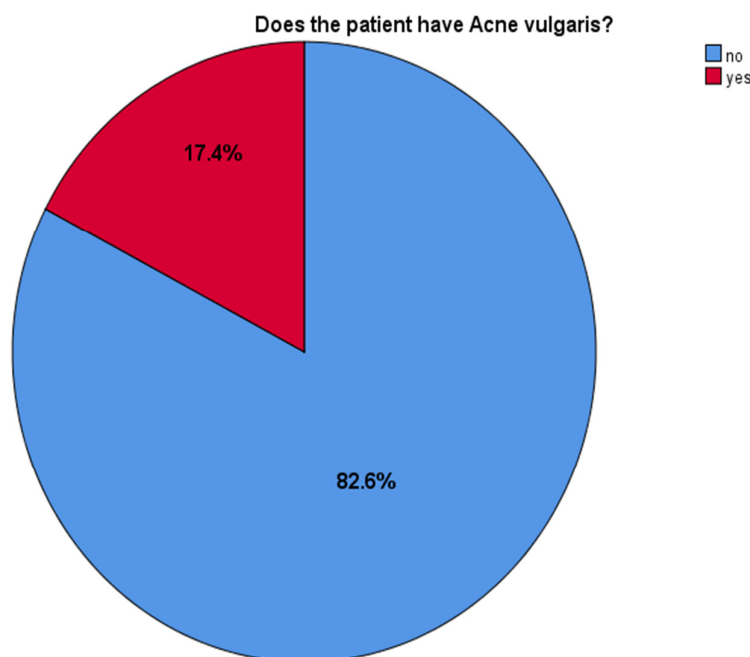


Figure 2: Prevalence of Acne Vulgaris among patients attending dermatology OPD at SPHMMC

5.3 Clinical Characteristics of Acne Vulgaris

Papulopustular lesions were the most common clinical form occurring in 31(73.8%) of acne patients, 24(57.1%) had comedons and 3(7.1%) had nodular lesions. 25(59.5%) of the acne patients had lesion over both the face and trunk while the rest had only facial lesion. According to GAGS most of the cases have mild 20(47.6%) or moderate acne 19(45.2 %), with only 3(7.2%) patients showed signs of severe acne. Of the total acne patients, 11(26.2%) had no complication, 28(66.6%) individuals had post inflammatory pigmentation, 11(26.1%) had atrophic scarring; only 1(3.2%) patient had hypertrophic scar. In 13(31%) of the cases the acne lesions were asymptomatic, while 18(62.1 %) were complaining irritation/burning sensation and 14(48.3%) had itching. For exacerbating factor, 13(30.9%) complained exacerbation of acne by self-manipulation of lesions, 10(23.8%) had flare during stress and 7(16.6%) females complained premenstrual flare. 35(83.3%) of acne patients have oily face and 22(52.4%) of the respondents have family history of acne. In addition, 17(45.5%) were not on any treatment, 17(45.5 %) were on topical treatment while the rest were on systemic treatment (Table 3).

Table 3: Clinical Characteristics of Acne Vulgaris

Clinical characteristics		Frequency (n=42)	Percent %
Sex	Males	16	38.1
	Females	26	61.9
Age group (years)	10-19	21	50
	20-24	8	19
	25-40	13	31
Age of onset (mean $\pm$ SD)years	Males	16.38 $\pm$ 1.628 years	
	Females	18 $\pm$ 3.124 years	
Acne distribution	Facial only	17	40.5
	Facial and trunk	25	59.5
Acne type	Comedones	24	57.1
	Papulopustular	31	73.8
	Nodulocystic	3	7.1
Acne severity (according to GAGS)	Mild	20	47.6
	Moderate	19	45.2
	Severe	3	7.2
Complication	No complication	11	26.2
	Hyperpigmentation	28	66.6
	Atrophic scar	11	26.1
	Hypertrophic/keloidal scar	1	2.3
Symptom	Asymptomatic	13	31
	Itching	14	33.3
	Irritation/burning sensation	18	42.8
	Pain	11	26.2
Exacerbating factor	Premenstrual phase	7	16.6
	Stress	10	23.8
	Foods (dairy, sweets, nuts)	4	9.5
	Prolonged sun exposure	4	9.5
	Self-manipulation of lesions	13	30.9
Treatment	No treatment	17	40.5
	Topical treatment	17	40.5
	Oral treatment	8	19

5.4. Factors associated with Acne vulgaris

Bivariable logistic regression analysis was done to examine the association of each independent variable with Acne vulgaris. Variables with P-value of less than 0.25 on bivariable logistic regression were age, residence, marital status, skin type, cosmetic make up use and family history of acne. These independent variables were then entered in to multivariable analysis, on which the strength of association was measured by OR with 95% confidence interval and variables associated with acne vulgaris with P-value <0.05 considered as significantly associated. In multivariable analysis adolescent age, skin type and family history of acne were significantly associated with the development of acne vulgaris.

As shown in table 4, in multivariable logistic regression analysis, individuals between the ages of 10-19 are 3.4 times more likely to develop acne vulgaris compared to age above 25 [AOR=3.414; 95% CI(1.006,11.584)]. Individuals who have oily skin type are 10.3 times and those with mixed skin type were 5.2 times more likely to have acne vulgaris compared to those who have dry/Normal skin type, respectively [AOR=10.356; 95% CI(3.746, 28.634)] and(AOR=5.296; 95% CI(1.096, 25.585)]. Individuals with positive family history (either in parents and/or siblings) of acne vulgaris are 5.9 times more likely to have acne vulgaris compared to their counterparts [AOR=5.957; 95% CI (2.295, 15.458)].

Table 4: Bivariable and multivariable logistic regression of factors associated with acne vulgaris among patients attending dermatology OPD at SPHMMC, Addis Ababa, Ethiopia, 2023

Variable	Categories	Acne Vulgaris		COR(CI)	P- value	AOR(CI)	P-value
		Yes	No				
Age	10-19	21	62	2.658(1.242-5.684)	0.012	3.414(1.006-11.584)	0.049*
	20-24	8	36	1.744(0.668-4.550)	0.254	1.298(0.349-4.828)	0.697
	25-40	13	102	1			
Residence	Urban	36	145	2.276(0.909-5.701)	0.079	1.272(0.400-4.042)	0.684
	Rural	6	55	1			
Marital status	Single(unmarried)	35	128	2.812(1.189-6.655)	0.019	1.949(0.524-7.246)	0.319
	Married/divorced	7	72	1			
Family history of Acne	Yes	22	29	5.485(2.459-12.234)	0.000	5.957 (2.295-15.458)	0.000*
	Don't know	7	77	0.657(0.250-1.729)	0.395	1.697(0.523-5.506)	0.378
	No	13	94	1			
Skin type	Oily	32	62	10.409(4.131-26.226)	0.000	10.356(3.746-28.634)	0.000*
	Mixed	4	17	4.745(1.214-18.547)	0.025	5.296(1.096-25.585)	0.038*
	Dry/Normal	6	121	1			
Cosmetic make-up use	Never	26	168	1			
	Occasionally	11	26	2.734(1.208-6.189)	0.016	2.490(0.848-7.315)	0.097
	Almost daily use	5	6	5.385(1.533-18.919)	0.009	3.867(0.754-19.827)	0.105

COR: Crude Odds Ratio; AOR: Adjusted odds ratio; CI: Confidence interval

*variables of significant association (p value <0.05) in multivariable logistic regression

6. DISCUSSION

This hospital based cross sectional study was done to assess the prevalence of Acne vulgaris and its associated factors among dermatology outpatients at SPHMMC in Addis Ababa, Ethiopia. This study revealed the prevalence of Acne vulgaris to be 17.4%, (95% CI=12.8-22.7). Factors significantly associated with acne vulgaris were family history of acne, skin type and age.

The prevalence of acne in this study was comparable to the study conducted at Mekelle, northern Ethiopia which showed the magnitude of acne to be 19.4%(7). It is also comparable to studies done in Belbis City of Egypt 21.6% (36). However, higher prevalence is reported in many other countries such as Saudi Arabia 65%(37), China 39.2%(27), Egypt 33.5%(22) and Nigeria 64.4%(29). On the other hand, the current study prevalence is higher than a study done in rural western Kenya which found prevalence of acne vulgaris to be 11.2%(23) and 12.9% in Ghana study(29). These differences could be due to methodological differences of the studies (for example community based vs institution based studies), method of assessment of acne (self-reporting vs physician diagnosis) or due to the fact that different studies targeted different study groups (e.g., only teenagers, only young adults or both adolescents and adults). Genetics and different lifestyles in the societies could also be the cause for the different prevalence of Acne vulgaris in different nations.

Regarding to the prevalence of acne by sex; it was found that 61.9% were females in this study. Higher female prevalence is also seen in a study done at Saudi Arabian that showed only 34.0% of males compared to 61.0% of female acne sufferers(17) and another study done in Egypt also found higher female(60%) prevalence than males(40%)(22). This higher prevalence in females could be due to hormonal fluctuations that occur during menstruation or pregnancy which can trigger sebaceous glands to secrete more sebum, or it may also be due to higher health care seeking behaviour in females with skin conditions that are cosmetically unacceptable.

In multivariable logistic regression analysis, individuals between the ages of 10-19 are 3.4 times more likely to develop acne vulgaris compared to age above 25. Similarly, a study done in Lithuania found the prevalence of acne was highest among adolescents aged 13–15 and 16–19 years, 96.3% (95% CI: 94.3–98.3) and 96.1% (95% CI: 94–98.2)

respectively(14).This was also found in the study done in Eskisehir, Turkey(38). This may be due to higher level of androgen and sebum production with pubertal age. Androgens stimulate increased sebum production and predispose to ductal hypercornification with the formation of comedones(29).

The presence of acne in the family was one of the variables which were significantly associated with acne with AOR of 5.957 (2.295-15.458). This is in line with a study done in Singapore where positive familial history of acne was strongly associated with increased odds for acne presentation, even after controlling for age and gender(25).This was also suggested by study done in Mekelle Ethiopia(7), Nigeria(29), UAE(9), Saudi Arabia(10), china(18), Egypt(39) and some European countries(26). This indicates that acne is a highly heritable trait.

Those who had oily and mixed skin type were 10.3 times and 5.2 times more likely to have acne vulgaris compared to those who have dry/Normal skin type, respectively. Similar finding was found in an Afghanistan study, which found the odds of getting acne increases by a factor of 8.81 if someone has oily skin(32). Similar findings were found in studies done in China(32) and Saudi Arabia(16). This may be due to *Propionibacterium* acne favouring environments with high sebum levels; therefore, having oily and mixed skin characterized by higher sebum levels increases the risk of acne presentation.

Aside from the above, no significant association with acne vulgaris was observed for other evaluated factors such as dietary habits (regular eating of milk, other dairy products, sweets, nuts, and oily foods), smoking and being overweight/ obese. These were positively associated with acne in studies done in different countries.

The strength of this study is that it tried to assess many factors which can be associated with acne vulgaris which were not assessed in previous studies and diagnosis and clinical assessment was done by dermatology residents.

LIMITATION OF THE STUDY

- The intrinsic weakness of cross-sectional design, which does not allow us to ascertain the temporal relationship between presumed risk factors and Acne Vulgaris.
- Some responses may not be accurate due to subjective responses, recall biases and social desirability bias.
- Since the study was done in one institution, it might not be generalized to the general population.
- Other psychosocial factors contributing to acne stress, depression, anxiety, and sleep quality were not assessed in this study so could be taken into account in future studies

7. CONCLUSION

The prevalence of acne in the SPHMMC dermatologic OPD was found to be comparable to study conducted in our country and some African countries. Presence of acne in the family, oily/mixed skin type and adolescent age were found to be significant factors associated with acne vulgaris.

RECOMMENDATION

For Physicians/ Dermatologists/Health facilities

- Physicians should concentrate on individuals with a positive family history of acne, regarding early detection and treatment. Additionally, more research on the genetic susceptibility to acne should be conducted.
- Treatments to control excess sebum production should be one of the main treatment goals in patients with Acne vulgaris.
- Efforts should be made in making acne therapeutics more available by the responsible body as appropriate intervention is essential to prevent complications such acne scarring, psychological impacts and secondary impaired social function.

For researchers

- Apply further research in other settings with recruiting high number of participants for more precise generalization and identification of other risk factors.

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9. ANNEXES

Annex I: Conceptual Frame work

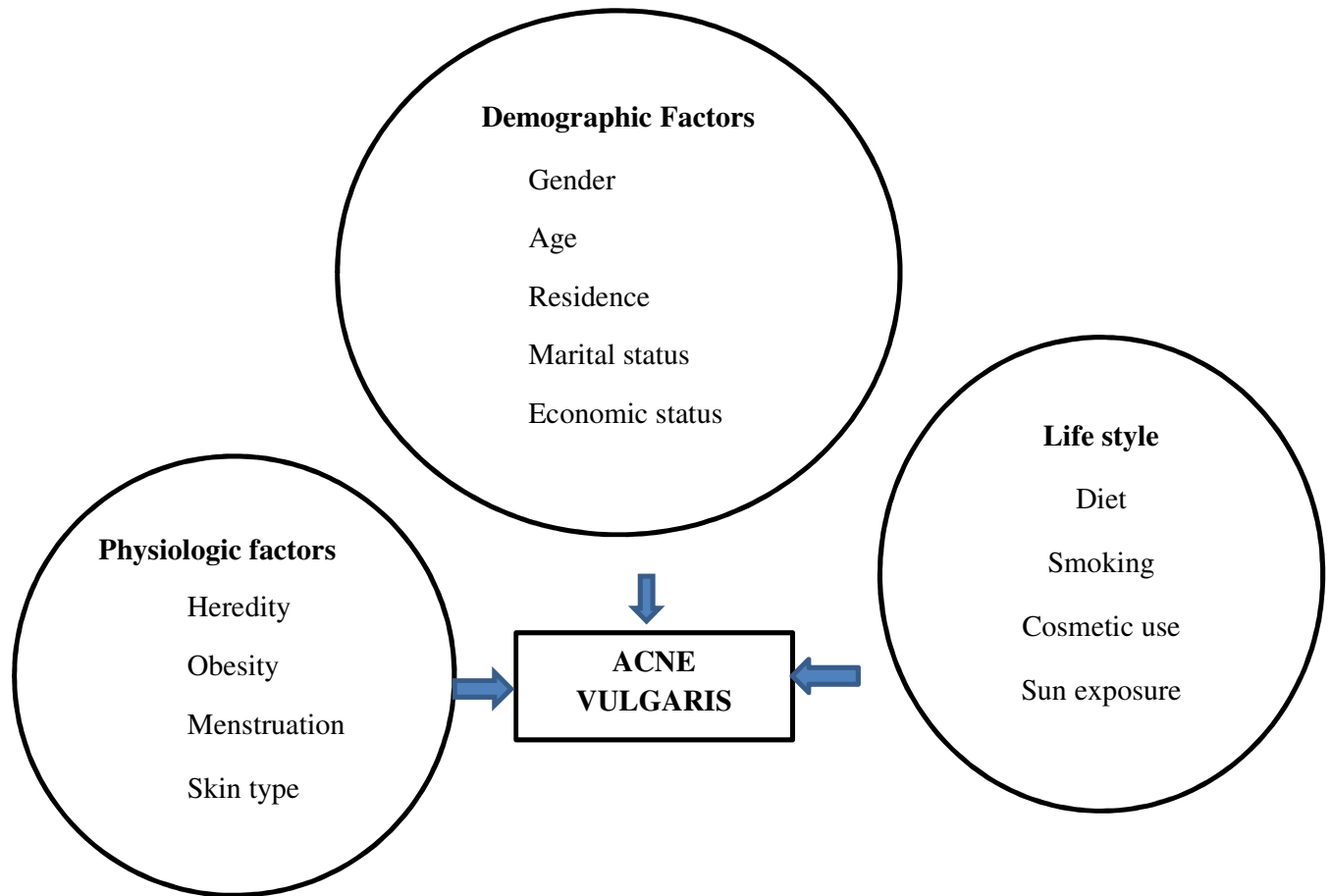


Figure1: Conceptual Framework on factors associated with acne Vulgaris(11).

Annex II. Information Sheet and consent form (English Version)

PARTICIPANT INFORMATION SHEET

Hello, how are you? My name is ----- I am working as a data collector on behalf of Saada Yasin (MD) who is a dermatovenerology resident at SPHMMC who want to conduct this survey. This information sheet is prepared to explain the Purpose of this research in order to get your willingness to participate in the study. Please take time to listen the following information carefully. Ask questions if anything you listen is not clear or would like more information. Take time to decide whether or not to take part.

The study title: The prevalence of acne vulgaris and associated factor among patients attending dermatology OPD at SPHMMC, Addis Ababa, Ethiopia.

Purpose of the study: This study will seek to assess the prevalence and associated factor of acne vulgaris and to write a thesis as a partial fulfilment of speciality degree in Dermatovenereology.

Procedure: If you are willing to participate in the research, you need to sign the consent form .then; you will be interviewed and examined for the presence of Acne by the data collectors and this may take 15-20 minutes.

Benefits: The study does not have direct financial or health care benefit to the participants. But indirectly the results from the study will help the policy makers, practitioners and concerned organizations to formulate strategy for improving Acne treatment and prevention.

Risk: It will take about 15 to 20 minutes of your time otherwise there are no anticipated risk to the participants, does not cause any physical harm, social discrimination or economic loss.

Confidentiality: All information will be kept with extreme confidentiality and shall not be divulged to any unauthorized person. Your identification (name, house number, phone number) will not be recorded on the questionnaire.

Rights to decline: Taking part in the study is voluntary and each participant has right to decline or withdraw at any stage of the research. You will not be denied the right of care for not participating.

For more information and question; here is the contact address of investigator;

Saada Yasin (MD) Tel: 0920594943 Email: saadayasinm@gmail.com

Thank you for taking the time to consider this study.

Consent Form (for participants whose age is above 18)

I confirm that I have read/ have been read to me, the participant information sheet of this study. I have had the opportunity to consider the information, ask questions and have had my questions answered satisfactorily. I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason, or my rights being affected. I, Mr / Mrs _____ hereby fully consent to volunteer in this study “PREVALENCE AND FACTORS ASSOCIATED WITH ACNE VULGARIS AMONG PATIENTS ATTENDING DERMATOLOGY OPD AT SPHMMC, ADDIS ABABA, ETHIOPIA.”.

Date: _____ Signature of the Volunteer _____

Name of interviewer _____ Signature _____

➤ **Ascent Form** (for participants whose age is from 10 to 18)

My name is _____. I am asking you to take part in this research study because we are trying to learn more about Acne Vulgaris. If you agree to be in this study, you will be asked some questions and examined for acne on your face, back and chest. You talk this over with your parents before you decide whether or not to participate. We will also ask your parents to give their permission for you to take part in this study. But even if your parents say “yes”, you can still decide not to do this. If you don’t want to be in this study, you don’t have to be. Remember, being in this study is up to you. You can ask any questions that you have about the study at any time. If you think of a question later, you or your parents can contact me at Tel: 0920594943. You may stop being in the study at any time. Sign this form only if you:

- have understood what you will be doing for this study,
- have had all your questions answered,
- have talked to your parent(s)/legal guardian about this project, and
- agree to take part in this research

Date: _____ Signature of the Volunteer _____

Name of interviewer _____ Signature _____

➤ **Consent form** for parents/guardians of participants whose age is from 10-18

I have been asked to give consent for my daughter/son to participate in this research study. I have read the foregoing information, or it has been read to me. I have had the opportunity to ask questions about it and my questions have been answered to my satisfaction. I consent voluntarily for my child to participate as a participant in this study.

Print Name of Parent/Guardian _____ Signature of Parent /Guardian _____

Date _____

Annex III: Information sheet and consent form (Amharic version)

ለተሳታፊዎች ስለ ጥናቱ መረጃ የሚሰጥ ቅጽ

ጤና ይስጥልኝ

እኔ.....የቆዳ ህክምና ተማሪ ለሆነችው ዶ/ር ሰአዳ ያሲን በቅዱስ ጳውሎስ ሆስፒታል ስለ ቡጉር በሽታ ስፋት እና ተያያዥ ጉዳዮችን ለማወቅ በሚሰራው ጥናት ላይ መረጃ በመስጠሰብ ላይ እገኛለው። እርሶም በምናደርገው ጥናት ላይ እንዲሳተፉ ተጋብዘዋል። ይህ ቅጽ የተዘጋጀው ለመሳተፍ ከመወሰንዎ በፊት ስለ ጥናቱ መረጃ ለመስጠት ነው። ጊዜ ወስደው ቀጥሎ ያሉትን ሃሳቦች በጥሞና ለማድመጥ ይዘጋጁ። ግልጽ ያልሆነ ነገር ካለ ጥያቄ መጠየቅ ይችላሉ። ትንሽ ጊዜ ወስደው በጥናቱ መሳተፍ መቻል/አለመቻሉን ያሳውቁን። ፍቃደኛ ከሆኑ ከዚህ ቀጥሎ የሚኖረውን የተስማሚነት ቅጽ መፈረም ይኖርቦታል።

የጥናቱ ርዕስ: በአዲስ አበባ ውስጥ በሚገኘው በቅዱስ ጳውሎስ ሆስፒታል የቆዳ ክፍል የብጉር በሽታ ስፋት እና ተያያዥ ጉዳዮች

የጥናቱ ዓላማ: በአዲስ አበባ ውስጥ በሚገኘው በቅዱስ ጳውሎስ ሆስፒታል የቆዳ ክፍል የብጉር በሽታ ስፋት እና ተያያዥ ጉዳዮችን ለመገምገም

የጥናቱ አካሄድ: በጥናቱ ላይ ለመሳተፍ ፍቃደኛ ከሆኑ የስምምነት ቅጽ ላይ ይፍርሙና፤ 15 ደቂቃ የሚፈጅ ቃለ መጠይቅ ያደርጋሉ። በተጨማሪም ሰውነቶ ላይ ቡጉር መኖር አለመኖሩን በመረጃ ሰብሳቢው ይጣራል።

የጥናቱ ጥቅም: በዚህ ጥናት በመሳተፍዎ ክፍያ ወይም ሌላ አይነት ቀጥተኛ ጥቅም አያገኙም ፤ ነገር ግን ለጥናቱ ውጤታማነትና አላማ መሳካት ታላቅ ጠቀሜታ አለው። በመጨረሻም ከዚህ ጥናት የሚገኘው ውጤት በብጉር በሽታ ላይ ባለሙያዎች በማስረጃ የተደገፈ እቅድ ለማቀድና፤ አገልግሎቱን ለሚሰጡ የጤና ባለሙያዎች ጥራት ላለው ተጨማሪ አገልግሎት የመረጃ ግብዓት ሆኖ ያገለግላል ተብሎ ይታሰባል ። እንዲሁም ውደፊት ከዚህ ተመሳሳይ ጥናት ለሚያደርጉ ምሁራን ጥልቅ ጥናት ለማድረግ የሚያስችል መረጃ ይሆናል።

ከጥናቱ ጋር ሊኖር የሚችል ጉዳት : በዚህ ጥናት ላይ በመሳተፍዎ ችግር ይፈጠራል ወይም ጉዳት አለው ብለን የምንሰጋው ነገር የለም። ነገር ግን ከጊዜዎት ላይ ወደ 15 ደቂቃ ይወስድቦታል። በዚህ ጥናት ላይ አለመሳተፍ በሚያገኙት አገልግሎት ላይ የሚያደርሰው ጉዳት የለም።

ሚስጢራዊነት፡ ይህ ከእርሶ የሚሰበሰበው መረጃ ሚስጢራዊነቱ የተጠበቀ ነው። በጥናቱ ላይ የእርስዎን አድራሻም ሆነ ስም የማንጠቅስ መሆኑን እንገልጻለን።

በጥናቱ ያለመሳተፍ ወይም አቋርጦ የመውጣት መብት፡ በዚህ ጥናት ላይ መሳተፍ በፍጹም ፍቃደኝነት ላይ የተመሰረተ ነው። ስለሆነም ያለመሳተፍ ሙሉ መብት አለብዎት እንዲሁም በመጠይቁ መሳተፍ ከጀመሩ በኋላ አንዳንድ ጥያቄዎችን አለመመለስ ሆነ በማንኛውም ሰዓት ማቋረጥ ይችላሉ ።

ለተጨማሪ መረጃ፡ በዚህ ጥናት ላይ ተጨማሪ መረጃ ከፈለጉ የጥናቱ ባለቤት ዶ/ር ሰአዳ ያሲንን በስልክ ቁጥር+251920594943 ወይም ኢ-ሚይል saadayasinm@gmail.com ሊያገኙን ይችላሉ።

ስለዚህ መረጃውን ለመስጠት እና በዚህ ጥናት ተሳታፊ እንዲሆኑልኝ በአክብሮት እጠይቀዎታለሁኝ።

የስምምነት ማረጋገጫ ቅጽ (እድሜያዊው ከ18 በላይ ለሆኑ)

በዚህ ጥናት ለመሳተፍ በመርጃ ወረቀቱ ላይ የተዘጋጀውን ፅሁፍ ተነብልኝ ወይም አንብቤ በትክክል መረዳቴን አረጋግጣለሁ። ስለጥናቱ ያለውን ሁኔታ እንዳውቅና ጥያቄም እንደጠይቅ ባገኘሁት እድል ለጠየኩት ጥያቄዎች አጥጋቢ መልስም ተስቶኛል። እንዲሁም ይህ ጥናት በፍቃደኝነት ላይ የተመሰረተ እንደሆነ እና በማንኛውም ጊዜ መቀጠል ካልፈለኩኝ ያለምንም ምክንያት መብቴ ሳይነካ ማቋረጥ እንደምችል ተረድቻለሁ። ጥናቱ ላይ ባለመሳተፍ የሚምጣ ጉዳት እንዲሁም በመሳተፍ የማገኘው የተለየ ጥቅም እንደሌለ እረዳለው ። ስለዚህም በቅዱስ ጳውሎስ ሆስፒታል ቆዳ ክፍል ስለ ቡጉር እና ተያያዥ ጉዳዮችን ለማወቅ በተዘጋጀ መጠይቅ ላይ በራሴ ሙሉ ፍላጎት ለመሳተፍ ፈቃደኛ ነኝ። ፍቃደኛ መሆኔንም በፊርማዬ አረጋግጣለሁ።

የተሳታፊው ፊርማ----- ቀን-----

የመረጃው ሰብሳቢው ፊርማ -----

የስምምነት ማረጋገጫ ቅጽ (እድሜያቸው ከ10-18 ለሆኑ)

ሰላም እኔ..... እባላለሁ። የቆዳ ህክምና ተማሪ ለሆነችው ዶ/ር ሰአዳ ያሲን በቅዱስ ጳውሎስ ሆስፒታል ስለ ቡጉር እና ተያያዥ ጉዳዮችን ለማወቅ በሚሰራው ጥናት ላይ መረጃ በመስጠት ላይ እገኛለው። በዚህ ጥናት ላይ እንዲሳተፉ እምጠይቅት ስለቡጉር በሰፊው ለማወቅ ሲሆን በዚህ ጥናት ላይ ለመሳተፍ ፍቃደኛ ከሆኑ የተወሰኑ ጥያቄ ይጠየቃሉ ። ይህንንም ከቤተሰብዎ ጋር ተነጋግረው ይወስናሉ። ስለመሳተፍዎ ቤተሰብዎንም ፍቃድ እንጠይቃለን። ነገር ግን ቤተሰብዎ ቢስማሙ እንኳን እርስዎ ያለመስማማት መብትዎ የተጠበቀ ነው። ማንኛውንም ስለ ጥናቱ ግልጽ ያልሆነሎትን ጥያቄ በማንኛውም ሰአት መጠየቅ እንዲሁም በመጠይቁ ወቅት መጠየቅ ካልፈለጉ ማስቆም ይችላሉ።ይህንን ቅጽ በደንብ ከተረዱ፣ ከቤተሰብዎ ከተነጋገሩና ከተስማሙ ብቻ መስማማትዎትን በፊርማዎ ያረጋግጡልን።

የተሳታፊው ፊርማ----- ቀን-----

የመረጃው ሰብሳቢው ፊርማ-----

የስምምነት ማረጋገጫ ቅጽ (እድሜያቸው ከ10-18 ለሆኑ በቤተሰባቸው ወይም በአሳዳጊያቸው የሚሞላ)

ስለልጄ በዚህ ጥናት ላይ የመሳተፍ ፍቃድ ተጠይቄአለሁ። በመረጃ ቅጹ ላይ የተጻፈውን መረጃ በሙሉ እንብቤአለው ወይም ተነቦልኛል፣ተረድቻለሁም። ስለዚህም ለልጄ በጥናቱ ላይ መሳተፍ ፍቃዴን ሰጥቻለሁ። መስማማቴንም የሚያረጋግጥ ፊርማ ፈርማለሁ።

የተሳታፊው ቤተሰብ ወይም አሳዳጊ ፊርማ-----ቀን-----

Annex IV: Information sheet and consent form (Afaan Oromo Version)

Unka odeeffannoo waa'ee qorannichaa hirmaattotaaf kennu

Fayyaa naaf kenni

Ani-----Barattuu barnoota gogaa tokkoof Dr.SaadaaYaasiin Hospitaala Qulqulluu Phaawuloositti waa'eedhukkuba Finniisaa fi dhimmoota kanaan walqabatan beekuf piroojektii qorannoo tokkoof daataa walitti qabaa jira. Qorannoo keenya irrattis akka hirmaatta naffeeramtaniittu. Unkaan kun hirmaachuf murteessuu keedura waa'ee qorannichaa odeeffannoo akka kennuuf kan qophaa'edha. Yeroo fudhattee yaadota armaan gadii sirriitti dhaggeeffachuuf qophaa'i. Yoo wanti tokko ifa hintaane gaaffii gaafachuu dandeessa. Meeyeroo muraasa fudhadhaatii qorannaa kana irratti hirmaachuu yoodandeessan nuuf ibsaa. Yoo walii galte unka walsimannaa armaan gadii mallatteessuu si barbaachisa.

Mata duree Qorannichaa: Dhukkuba finniisaa fidhimmoota kanaan walqabatan kutaa gogaa Hospitaala Qulqulluu Phaawuloos Addis Ababaa keessatti

Kaayyoon qorannichaa: Tatamsa'inadhukkuba finni saafi dhimmoota kanaan walqabatan kutaa gogaa Hospitaala Qulqulluu Phaawuloos Addis Ababaatti madaaluuf

Mala qorannichaa: Qorannicha irratti hirmaachuf yoo walii galte unka hayyamaa mallatteessitee daqiiqaa 15f gaaffii fi deebii ni goota. Kana malees,namni daataa walitti qabu sun qaama keessan irratti finniisni jiraachuu fi dhiisuu isaan iilaala.

Faayidaan qorannichaa: Qorannoo kana irratti hirmaachuu keetin kaffaltii ykn faayidaa kallattiin biraa hin argattu, Garuu bu'a qabeessummaa fi galma ga'iinsa kaayyoo qorannichaaf barbaachisummaa guddaa qaba. Dhumarratti, bu'aan qorannoo kanarraa argame ogeeyyiin dhukkuba finniisaa karoora raga irratti hundaa'e karoorfachuuf, akkasumas ogeessota fayyaa tajaajila kana kennan tajaajila dabalataa qulqullina qabuuf akka qabeenya odeeffannootti akka oolutti fudhatama. Akkasumas,gara fuulduraatti hayyoota qorannoowalfakkaataa hojjetaniif qorannoo gadi fageenyaa gaggeessuuf odeeffannoo ta'a.

Miidhaan qorannoo kanarratti jiraachuu danda'u: Qorannoo kana irratti hirmaachun rakkoon ykn miidhaan akka hin uumamne hin sodaannu. Garuu yeroo keessan keessaa gara

daqiiqaa 15fudhata. Qorannoo kana irratti hirmaachuu dhiisuun tajaajila argattu irrattid hiibbaa hin geessisu.

Iccitii qabaachuu: Odeeffannoon isin irraa walitti qabame kun iccitiidha. Teessoo ykn maqaa keessan qorannoo keessatti akka hin kaasne ibsina.

Mirga qorannicha irratti hirmaachuu dhiisuu ykn keessaabahuu: Qorannoon kun hirmaannaan guutummaatti fedhii ofiitin kan raawwatamuudha. Kanaafuu, hirmaachuu dhiisuf mirga guutuu qabda, qorannoo kana irratti hirmaachuu erga jalqabdee booda gaaffii kamiyyuu deebisuu dhiisuu ykn yeroo barbaaddetti dhaabuu dhiisuu filachuu dandeessa.

Odeeffannoo dabalataaf: Qorannoo kana irratti odeeffannoo dabalataa yoo barbaaddan abbaan qorannichaa Dr.SaadaaYaasiin. Lakkoofsa bilbilaa +251920594943 ykn iimeelii saadayasinm@gmail.com irratti nu qunnamuu dandeessu.

Kanaaf odeeffannoo kennamee fi qorannoo kana irratti akka hirmaattan kabajaan isin gaafadha.

Unka Hayyama (Warra umuriin isaanii18ol ta'eef)

Qorannoo kana irratti hirmaachuf odeeffannoo unka iyyannoo irratti argamu dubbisee hubachuu koo dubbiseera ykn mirkaneessen jira. Gaaffii gaafachuu fi haala qorannichaa akkan beeku carraan naaf kenname. Qorannoon kun fedhii kootiin kan raawwatamu ta'uu fi yeroo kamiyyuu itti fufuu yoo hinbar baanne mirga koo osoo hin tuqin ofirraa baasuu akkan danda'us nan hubadha.Qorannicha irratti hirmaachuu dhabuun miidhaa akka hin qabnee fi faayidaan addaa ani hirmaachuu irraa argadhu akka hin jirre nan hubadha. Kanaaf, waa'ee fincaanii fi dhimmoota kanaan walqabatan baruuf gaaffilee kutaa gogaa Hospitaala Qulqulluu Phaawuloos qopheesse irratti fedhii koo guutuudhaan hirmaachuuf fedhii qaba. Hayyama koo mallattoo kootiin nan mirkaneessa.

Mallattoohirmaataa-----guyyaa-----

Mallattoo nama odeeffannoo walitti qabuu-----

Unka hayyama kennuu (hirmaattoota umuriin isaanii waggaa 10 hanga 18 ta'aniif).

Akkam jirtu, An-----Barataa barnoota gogaa tokkoof Dr. Saada Yaasiin Hospitaala Qulqulluu Phaawuloositti Hamma fincaanii fi dhimmoota kanaan walqabatan beekuuf Pirojektii qorannoo tokkoof daataa walitti qabaa jira. Waa'ee fincaanii caalaatti baruuf qorannoo kana irratti akka hirmaattan kan isin gaafataman yoo ta'u qorannoo kana irratti hirmaachuuf yoo walii galtan gaaffiiwwan murtaa'an isin gaafatamu. Kana irratti maatii keessan waliin mari'attanii murtoo ni gootu. Maatii keessanis hirmaachuuf hayyama ni gaafanna. Garuu maatiin kee yoo walii galanillee, walii galuu dhiisuuf mirga qabda. Waa'ee qorannichaa gaaffii siif ifa hin taane kamiyyuu yeroo barbaaddetti gaafachuu dandeessa, yeroo qorannootti gaafachuu yoo hin barbaanne dhaabuu dandeessa. Unka kana mallatteessuu kan dandeessan yoo sirriitti hubatte, maatii kee waliin haasoftee fi walii galte qofa.

Guyyaa:_____Mallattoo_____

Maqaa nama gaaffii fi deebii godhee_____Mallattoo_____

Unka hayyamaa warra/guddistoota hirmaattoota umuriin isaanii waggaa 10-18 ta'aniif.

Intalli/ilmi koo qorannoo kana irratti akka hirmaatuuf hayyama akkan kennu gaafatameen jira. Odeeffannoo dubbiseera, ykn naaf dubbifameera. Waa'ee qorannoo kanaa gaaffii gaafachuuf carraa argadheera, gaaffiin gaafadhe kamiifiyyuu deebii quubsaa argadheera. Mucaan koo qorannoo kana irratti akka hirmaatu fedhii kootiin hayyama nan kenna.

MaqaaWarraa/Guddistuu_____MallattooWarraa/Guddistuu_____

Guyyaa_____.

Annex V: Questionnaire English Version

Questionnaire to assess the prevalence and factors associated with acne vulgaris among patients attending dermatology OPD at SPHMMC, Addis Ababa, Ethiopia, 2023 G.C

Questionnaire Code _____

Date of data collection-----

Name of data collector----- signature-----

No	Part-I Demographic characteristics		
001	Age		
002	Sex	1. Male 2. Female	
003	Residence	1. Urban 2. Rural	
004	Education level	1. No formal education 2. Primary 3. Secondary 4. College/university	
005	Marital status	1. Single 2. Married 3. Divorced 4. Widowed	
006	Occupation	1. Student 2. Housewife 3. Private Business 4. Employed 5. Casual laborer 6. Farmer 7. unemployed 8. Others specify	

007	Monthly Income	
	Part II: Assessment of factors associated with acne vulgaris	
101	Familial history of Acne	1. Yes 2. No 3. Don't know
	If yes, what is your relation? (more than one choice is possible)	1. Mother 2. Father 3. Both parents 4. Sibling
102	For female participants: Menstrual cycle:	1. Regular 2. Irregular
103	Skin Type:	1. Oily 2. Dry 3. Normal 4. Mixed
104	Cosmetic make-up use	1. Occasionally 2. Almost on a daily basis 3. Never
105	In the past 12 months, how often, on average, did you drink Milk?	1. Never/ occasionally 2. Once or twice/week 3. Most or all days
106	In the past 12 months, how often, on average, did you drink or eat other Dairy Products (yogurt, cheese)?	1. Never/ occasionally 2. Once or twice/week 3. Most or all days
107	In the past 12 months, how often, on average, did you eat Oily foods (chips/fried food)?	1. Never/ occasionally 2. Once or twice/week 3. Most or all days
108	In the past 12 months, how often, on average, did you eat Sweet foods (chocolate, Soft drinks, Cakes, ice-cream)?	1. Never/ occasionally 2. Once or twice/week 3. Most or all days
109	In the past 12 months, how often, on average, did you eat Nuts?	1. Never/ occasionally 2. Once or twice/week

		3. Most or all days				
110	Tobacco smoking	1. Current smoker 2. Ex-smoker 3. Never smoked				
111	Level of sun exposure due to your work or daily activities.	1. Mild (less than 1 hour) 2. Moderate (2-3 hours) 3. Severe (>3 hours)				
112	Sleep (hours/day) on most of the days:	1. Less than 7 2. 7-9 3. More than 9				
113	Body mass index: Weight= Height= BMI	1. Underweight 2. Normal 3. Overweight 4. Obese				
Part III: Clinical Examination						
201	Having Acne	1. Yes 2. No				
202	Acne distribution and Type of lesions					
	Area	No lesion	Comedones	Papules	Pustules	Nodules
	1. Face					
	Forehead					
	Right cheek					
	Left cheek					
	Nose					
	Chin					
	2. Upper back					
	3. Chest					
203	Acne severity(according to GAGS)	1. Mild 2. Moderate 3. Severe				

204	Complications from acne	1. No complication 2. Hyperpigmentation 3. Atrophic scar 4. Hypertrophic scar 5. Keloids
	Part IV: For patients who have acne:	
301	Age of onset	
302	Any symptom associated with the lesion?	1. Asymptomatic 2. Itching 3. Irritation/burning sensation 4. Other
303	Did you identify any factor exacerbating your acne? (more than one choice is possible)	1. Premenstrual phase 2. Season 3. Stress 4. Food (which type-----) 5. Cosmetics 6. Constant exposure to sunlight 7. Self-manipulation of lesions 8. Others-----
304	Are you on any treatment for acne :	1. No treatment 2. Topical medication 3. Oral medication

Thank you for your kind cooperation. !!!!!!!

Annex VI: Global acne grading scale (GAGS)

Location	Factor
Forehead	2
Right cheek	2
Left cheek	2
Nose	1
Chin	1
Chest and upper back	3

- Each type of lesion is given a value depending on severity:
 - ✓ No lesions = 0,
 - ✓ Comedones = 1,
 - ✓ Papules = 2,
 - ✓ Pustules = 3 and
 - ✓ Nodules = 4.
- The score for each area (Local score) is calculated using the formula:
Local score = Factor × Grade (0-4).
- The global score is the sum of local scores, and acne severity was graded using the global score.
 - Mild=A score of 1-18;
 - Moderate= score of 19-30,
 - Severe= score of 31-38,
 - Very severe= score of ≥ 39 .

