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Associations among Acne Vulgaris and Western Diet

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Abstract

- Acne vulgaris is one of the most common dermatologic conditions, especially among the adolescent population.
- The pathogenesis of acne is largely multifactorial, with heredity and hormones strongly contributing to one’s risk of developing the chronic inflammatory skin condition.
- High prevalence rates of acne in the adolescent population cannot be attributed solely to the influence of the Western diet (WD) that overstimulates insulin-like growth factors (IGFs).
- The purpose of this scholarly project is to determine if there is an association between the presence of acne vulgaris and the consumption of WD, and specifically high glycemic load and dairy products that comprise the typical WD.
- It is anticipated that research will find that consuming a WD increases IGF levels leading to hyperinsulinemia, and furthermore, acne presentation by increased sebum production.

Introduction

- Acne vulgaris, the most common skin ailment in the United States, has become a growing concern in today's population; more than 14 million office visits a year are attributed to the diagnosis and treatment of acne vulgaris (Mancini, 2008).
- This inflammatory disease of the sebaceous follicle now affects more than 85% of adolescents in Westernized nations (Mahmood, Spiegelman, Berkey, Danby, Rockett, Colditz, & Bowe, 2014).
- Acne is thought to be a disease of wealthy nations, where an abundance of food, particularly processed food, is readily available.
- Researchers seem to believe two major cellular processes, related to the pathophysiology of acne, determine if there is an association between acne vulgaris and the consumption of WD (Mahmood, Spiegelman, Berkey, Danby, Rockett, Colditz, & Bowe, 2014).
- One of these processes, termed the “hyperinsulinemia” theory, is thought to relate acne with the Western diet, correlating acne severity with high glycemic-load (HL) diets.
- A number of studies over the past several decades have supported this theory and established a link connecting high glycemic foods and dairy products to the development of acne vulgaris, the breakdown of high glycemic foods and dairy products; both have the propensity to cause acne (Cordain et al., 2002).
- Glycemic index (GI) and glycemic load (GL) levels were found to be higher among Kitavan subjects, nor the Ache Hunter-Gatherer group (Cordain et al., 2002).

Literature Review

Pathophysiology of Acne Vulgaris

- Increase in the production of adrenal androgens during adolescence typically occurs, leading to increased production of sebum by sebaceous glands.
- Increased sebum, along with the accumulation of epidermal cells and keratin, obstructs the hair follicle, causing swelling of the follicle and eventually forming the earliest acne lesion, known as a microcomedone (Feldman, Carecchia, Hambra & Hancock, 2010).
- As a keratin plug grows, causes greater follicular swelling and increases the likelihood that the follicle can become colonized with Propionibacterium acneus, a normal skin flora, and consequently the trigger for inflammatory acne.
- With the proliferation of P. acne, infiltration of inflammatory mediators are stimulated, causing a localized inflammatory response that results in painful papule or pustule (Dynamius, 2018).

Associations between High Glycemic Load Diet and Acne Vulgaris

- An randomized controlled trial performed by Cerman, et al. (2016) found that diets high with glycemic-load were positively associated with acne vulgaris for participants with present acne.
- Glycemic index (GI) and glycemic load (GL) were found to be higher (p = 0.022) when compared to the control group (p = 0.001). There was a positive correlation between acne severity and glycemic index values (p < 0.05) (Cerman et al., 2016).
- Kaymak, et al. (2007) found that dietary glycemic index, glycemic load, and insulin levels did not play a role in the pathogenesis of acne in young women.
- Smith, Mann, Braue, Makelainen, and Vanpours (2007) used a randomized, investigator-masked, controlled trial to compare the effects of a low glycemic-load (LGL) diet with a conventional Western diet. They found that nutrition-related lifestyle factors played a role in acne pathogenesis (Smith et al., 2007).
- Mann, Braue, Makelainen, and Varpioos (2007) used a randomized, investigator-masked, controlled trial to compare the effects of a low glycemic-load (LGL) diet with a conventional Western diet. They found that nutrition-related lifestyle factors played a role in acne pathogenesis (Smith et al., 2007).
- Increased expression of mTORC1 rises of serum insulin levels, which then in turn, signal the activation of mTORC1. Increased expression of mTORC1 and increases the likelihood that the follicle can become colonized with Propionibacterium acneus, a normal skin flora, and consequently the trigger for inflammatory acne.

Associations between Dairy Products and Acne Vulgaris

- A prospective cohort study of youth and lifestyle factors, titled, “A prospective cohort study of youth and lifestyle factors among teenaged boys. They concluded that a high glycemic-load (HL) diet was associated with acne vulgaris for participants with present acne. (Cerman et al., 2016).
- Researchers seem to believe two major cellular processes, related to the pathophysiology of acne, determine if there is an association between acne vulgaris and the consumption of WD (Mahmood, Spiegelman, Berkey, Danby, Rockett, Colditz, & Bowe, 2014).

Modeling and simulations

- The hyperinsulinemia that is linked with the Western diet, can cause a change in fasting insulin levels (p<0.05) (Cerman et al., 2016).
- With-acne vulgaris accounting for 35.0% of family medicine office visits in adolescents, suicidal ideation. Approximately 7% of patients with acne reported suicidal ideation (Valk, P.G., . . . Evers, A.W., 2008).
- In instances, suicidal ideation. Approximately 7% of patients with acne reported suicidal ideation (Valk, P.G., . . . Evers, A.W., 2008).
- The hyperinsulinemia that is linked with the Western diet, can cause a change in fasting insulin levels (p<0.05) (Cerman et al., 2016).

Discussion

- Review recent studies have suggested that as diets begin to Western diet, prevalence rates of acne vulgaris have increased.
- High-glycemic-load carbohydrates and dairy products now comprise nearly 40% of the daily energy in the typical Western diet in the United States, which is a significant increase in the glycemic load that has been occurring in the last few decades.
- With the increase in consumption of high-glycemic-load and dairy rich diets, the concentrations of insulin and IGF-1, as well as free-circulating androgens, has increased, leading to acne vulgaris.
- Taken together, these data suggest that the endocrine cascade induced by hyperinsulinemia enhances sebocyte synthesis, and contributes to hypersecretion of sebum. This increase in sebum production leads to the development of acne vulgaris, this increase is paramount.
- All in all, more current studies are warranted to thoroughly evaluate the associations between the high glycemic load and dairy-rich foods that make up Western diet.