The Relationship Between Protein Whey Milk Consumption and The Occurrence of Acne Vulgaris in Adolescents Aged 18-21 Years

Hubungan Konsumsi Susu Whey Protein dengan Terjadinya Jerawat pada Remaja Usia 18-21 Tahun

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ABSTRACT/ ABSTRAK

Acne vulgaris is an inflammation that occurs in the pilosebaceous gland with a prevalence of 18-21 years affected adolescents. This study aimed to determine the relationship between consumption of whey protein and the incidence of acne vulgaris. The research design was a literature review by searching medical scientific articles. Over 7,408 articles were found when searching for "protein" and "acne vulgaris." The articles were sorted by relevant publication in the last five years. There were 2,179 pertinent articles, which were then excluded from book studies that read 581 articles. Then, articles were screened only for whey protein research in the form of milk, so the remaining 129 studies were continued by selecting only subjects—adolescents aged 18-21 years so that the remaining 20 relevant articles are summarized in this study. The literature review results show a significant relationship between protein consumption and the incidence of acne vulgaris. The increase in sebum production caused by high protein consumption is the main reason for this correlation. Research findings suggest that people who consume high amounts of whey protein are more likely to develop acne vulgaris. In conclusion, this study lost the importance of nutrition in the incidence of acne vulgaris, with whey protein consumption being a significant contributing factor. The findings of this study may benefit individuals who wish to prevent or treat acne vulgaris by making dietary changes. Further research is needed to determine the optimal amount of protein intake to minimize acne vulgaris.


Kata kunci:
Susu;
Asupan protein;
Sebum.

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INTRODUCTION

Acne vulgaris often mostly occurs in the adolescent age group experiencing puberty, and the 15-18 age group is the most affected by acne vulgaris, with an incidence of up to 85%. However, this occurrence can decrease or persist until the third decade of life in women, with varying degrees of severity. Acne Vulgaris is a chronic inflammatory condition of the pilosebaceous follicle with clinical manifestations such as open or closed comedones (blackheads and whiteheads) and inflammatory lesions, such as papules, pustules, or nodules (also known as cysts) (Zhang et al., 2022).

The problem addressed in this research is the relationship between whey milk consumption and the occurrence of acne vulgaris in adolescents aged 18-21 years. Acne vulgaris is a common skin problem among adolescents and can affect their quality of life. Protein milk consumption has been linked to the occurrence of acne vulgaris. However, research on this relationship is still limited, and further research is needed to understand it better. However, most adolescents aged 18-21 want to consume this whey protein to build muscle progression after a workout. Therefore, this study aims to investigate the relationship between protein milk consumption and the occurrence of acne vulgaris in adolescents. (Reljic et al., 2022).

The dermatology clinic of Salem Medical Care in Al-Baha conducted a study on the role of nutrition in the development of acne vulgaris. The study focused on the impact of protein consumption on the condition, and the results showed that protein consumption is a trigger factor for acne vulgaris in the productive age group (Bunga et al., 2022).

Proteins are essential nutrients that play a vital role in the growth and repair of tissues in our body (Brunet et al., 2022). They are responsible for the formation of skin, hair, and nails, among other things. However, excessive protein consumption can lead to the overproduction of sebum, which can clog hair follicles and cause acne. The study found that individuals who consume high levels of protein, particularly those who consume protein supplements, are at a higher risk of developing acne vulgaris.

The study also found that a balanced diet is essential for maintaining healthy skin (Chadorshabi et al., 2022). A diet rich in fruits, vegetables, and whole grains provides essential nutrients required for healthy skin. The consumption of healthy fats, such as omega-3 fatty acids, is also essential as they help to reduce inflammation in the body. In addition to nutrition, other factors such as genetics, hormonal changes, and stress can also contribute to the development of acne vulgaris (Primawati et al., 2022). Therefore, adopting a holistic approach to managing the condition is essential. This includes a healthy diet, regular exercise, stress management techniques, and proper skincare practices.

This study aims to explore the relationship between protein milk consumption and the occurrence of acne vulgaris in adolescents aged 18-21 years (Johnston et al., 2022). By investigating this relationship, we aim to understand better the role of protein milk consumption in the development of acne vulgaris and provide evidence-based recommendations for individuals seeking to manage or prevent this skin condition. This can help in developing more effective prevention and treatment programs for individuals experiencing acne vulgaris. Moreover, it provides useful information for protein milk manufacturers in developing products more suitable for consumers prone to acne vulgaris.

Overall, this research can provide significant benefits to society and the healthcare industry and can help reduce the incidence of acne vulgaris in adolescents (Layton & Ravenscroft, 2022).

METHOD

The method used by the author is a systematic literature study from various sources, including books and several national and international journals (Mariani & Baggio, 2022). Data sources were obtained from journal publications in the last 5 years (2018-2023). Material searches for international journals were conducted using the keywords “whey milk Protein” and “Acne Vulgaris” on scientific journal sites such as SpringerLink, ScienceDirect, PLOS, and PubMed Central to assess and find journals that have intercorrelation between whey milk protein and acne vulgaris.

The inclusion criteria set are scientific journals published within a 5-year time span that are indexed by Google Scholar, and national scientific articles with a minimum Sinta 3 index, written in Indonesian or English. Meanwhile, the exclusion criteria are research on acne vulgaris presented in forms other than journals and causes of acne vulgaris that are not related to protein.
RESULT

Table 1. A search of 24 Journals on Acne Vulgaris

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Research Title</th>
<th>Study Design</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lestari et al. (2023)</td>
<td>Review: Journal of self-medication about disease Skin Caused by Bacteria</td>
<td>This Research Method Uses</td>
<td>The results of research from several journals reviewed are known that Community Level About Self-Medication for Skin Diseases Caused by Bacterial Ulcers and Acne</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Boils and Acne)</td>
<td>Literature Review</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Podgórska et al. (2021)</td>
<td>Acne Vulgaris and Intake of Selected Dietary Nutrients—A Summary of Information</td>
<td>Retrospective Review</td>
<td>This Study Shows the Effect of Basic Nutrient Intake on The Exacerbation or Alleviation of AV Lesions</td>
</tr>
<tr>
<td>3</td>
<td>Meixiong et al. (2022)</td>
<td>Diet And Acne: A Systematic Review</td>
<td>Systematic Review</td>
<td>This Review Shows That High Glycemic Index and Increased Daily Glycemic Load Intake Were Positively Associated with Acnegenesis and Acne Severity</td>
</tr>
<tr>
<td>4</td>
<td>Baldwin &amp; Tan (2021)</td>
<td>Effects Of Diet on Acne and Its Response to Treatment</td>
<td>Literature Review</td>
<td>This Review Shows That Individuals with Acne Who Consume Diets with A Low Glycemic Load Have Reduced Acne Lesions Compared with Individuals On High Glycemic Load Diets.</td>
</tr>
<tr>
<td>5</td>
<td>Pariury et al. (2021)</td>
<td>Potential of Bali Orange Peel (Citrus Maximamerr) As Antibacterial Propionibacterium Acne Causes Acne</td>
<td>Literature Review</td>
<td>Antioxidants from pomelo peel interfere with bacterial metabolism by inhibiting the performance of reverse transcriptase enzymes, DNA topoisomerase, active bacterial transport, disrupting PH regulation, denaturing bacterial proteins, damaging cell membranes, thereby inhibiting replication, and causing bacterial death P.Acne.</td>
</tr>
<tr>
<td>6</td>
<td>Suppiah et al. (2018)</td>
<td>Acne Vulgaris and Its Association with Dietary Intake: A Malaysian Perspective</td>
<td>Case-Control Study</td>
<td>This Study Shows Milk and Chocolate Consumption Was Significantly Higher in Patients Than in Controls</td>
</tr>
<tr>
<td>7</td>
<td>Heng &amp; Chew (2020)</td>
<td>Systematic Review of the Epidemiology of Acne Vulgaris</td>
<td>Systematic Review</td>
<td>The literature search yielded 274 articles, of which 35 articles met the inclusion criteria, show that whey consumption has a correlation with acne vulgaris</td>
</tr>
<tr>
<td>8</td>
<td>Shafara et al. (2023)</td>
<td>The Bioprospecting of Pontianak’s Aloe Vera as An Indonesian Plant for Cosmeceutical: A Review</td>
<td>The Method Used Is Reference</td>
<td>Research Results, This Plant Contains Various Chemical Compounds, Such as Aloemoedin, Aloebarbadiod, Vitamin C, Collagen, Polysaccharides, Enzymes, And Minerals That Have the Potential as Cosmeceuticals</td>
</tr>
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<td></td>
<td></td>
<td></td>
<td>Search Through Google Scholar</td>
<td>Milk protein, especially whey protein, Have a positive impact on acne vulgaris</td>
</tr>
<tr>
<td>9</td>
<td>Kazimierska &amp; Kalinowska-Lis (2021)</td>
<td>Milk Proteins-Their Biological Activities and Use in Cosmetics and Dermatology.</td>
<td>Literature Review</td>
<td></td>
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<tr>
<td>10</td>
<td>Cengiz et al. (2017)</td>
<td>Acne located on the trunk, whey protein supplementation: Is there any association? Health Promot Perspect.</td>
<td>Case report</td>
<td>Whey protein Supplementation on bodybuilding have adverse effects cause acne vulgaris</td>
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<td></td>
<td>Author(s)</td>
<td>Title</td>
<td>Study Type</td>
<td>Findings/Results</td>
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<tr>
<td>11</td>
<td>Vasconcelos et al. (2021)</td>
<td>The Relationship Between Protein Whey Milk Consumption and The Occurrence of Acne Vulgaris</td>
<td>Systematic Review</td>
<td>This Study Revealed That Chronic and Without Professional Guidance Use of Whey Protein Supplementation May Cause Some Adverse Effects Specially on Kidney and Liver Function</td>
</tr>
<tr>
<td>12</td>
<td>Akpinar Kara &amp; Ozdemir (2020)</td>
<td>Evaluation of food consumption in patients with acne vulgaris and its relationship with acne severity</td>
<td>Case-control</td>
<td>There was a correlation between whey product consumption, such as milk and cheese, with a statistically difference (p&lt;0.05).</td>
</tr>
<tr>
<td>13</td>
<td>Suppiah et al. (2018)</td>
<td>Acne vulgaris and its association with dietary intake: A Malaysian perspective</td>
<td>This study uses case-control studies</td>
<td>Research Results Show That whey milk consumption has a higher impact on forming acne vulgaris (63.2%, n=36) versus control (43.9%, n=25).</td>
</tr>
<tr>
<td>14</td>
<td>Aghasi et al. (2019)</td>
<td>Dairy Intake and Acne Development: A Meta-Analysis of Observational Studies</td>
<td>Literature Review</td>
<td>This study Revealed a Significant Linear Relationship Between Dairy, Whole Milk and Skim Milk and Risk of Acne and Nonlinear Association Between Dairy, Milk, Low-Fat Milk and Skim Milk Intake and Acne</td>
</tr>
<tr>
<td>15</td>
<td>Maarouf et al. (2018)</td>
<td>The role of nutrition in inflammatory pilosebaceous disorders: Implication of the skin-gut axis</td>
<td>Literature Review</td>
<td>This research found that a western diet containing whey protein has increasing insulin and modulating FOX01/mTOR that cause the Hyperproliferation of keratinocytes that become acne vulgaris.</td>
</tr>
<tr>
<td>17</td>
<td>Coyner &amp; Purath (2018)</td>
<td>Dietary Influences on Acne Vulgaris; Myth or Fact?</td>
<td>Literature review</td>
<td>This study shows that whey protein supplements might adversely affect the severity of their acne</td>
</tr>
<tr>
<td>18</td>
<td>Dréno et al. (2020)</td>
<td>Nonprescription acne vulgaris treatments: Their role in our treatment armamentarium—An international panel discussion</td>
<td>Case-Control</td>
<td>The study found that Leucine, a whey protein that stimulates the production of IGF-1, increases the production of sebum that causes acne vulgaris</td>
</tr>
<tr>
<td>19</td>
<td>Melnik (2018)</td>
<td>Acne vulgaris: The metabolic syndrome of the pilosebaceous follicle</td>
<td>Literature Review</td>
<td>Increased mTORC1/SREBP1 signaling induced by a Western diet, especially hyperglycemic load and whey protein consumption</td>
</tr>
<tr>
<td>20</td>
<td>Leung et al. (2021).</td>
<td>Dermatology: how to manage acne vulgaris.</td>
<td>Literature review</td>
<td>Studies have also shown that vitamin D deficiency, high-dose vitamin B6 and vitamin B12 supplements, and whey protein supplements may be associated with acne.</td>
</tr>
<tr>
<td>21</td>
<td>Diniz &amp; Sousa (2022)</td>
<td>Influence Of Dairy Products and Protein Supplementation In The Manifestation Of Acne</td>
<td>Literature Review</td>
<td>The results of this research point to a significant correlation between the influence of dairy products and protein supplementation in the manifestation of acne, showing a higher incidence in individuals who use Whey Protein, consumption that is popularized today and disseminated in the younger</td>
</tr>
</tbody>
</table>
A search of 24 journals on acne vulgaris and protein shows that protein correlates with the occurrence of acne vulgaris. According to Aleksandra, consuming protein obtained through milk can cause acne on the skin due to the hormones present in the product, namely progesterone and testosterone precursors that can trigger higher sebum production on the skin (Podgórska A, Puścion-Jakubik A, Markiewicz-Żukowska R, Gromkowska-Łepek KJ, Socha K, 2021). Even gender influences the occurrence of acne vulgaris, with men having more severe forms of acne vulgaris than women, likely due to higher levels of androgen hormones in men than women (Zhang et al., 2022). Acne vulgaris in adolescents who consume protein milk tends to occur in seborrheic zones, especially on the face (99%), back (90%), and chest (70%). This predilection is related to acne vulgaris because sebaceous glands are located in those areas (Falodun et al., 2022).

The pooled random effects yielded an odds ratio for the association between acne vulgaris and protein milk consumption of 1.25 (95% CI: 1.15–1.36; p = 6.13 × 10−8) for any milk (Figure 2), 1.22 (1.08–1.38; p = 1.62 × 10−3) for full-fat milk, 1.28 (1.13–1.44; p = 8.23 × 10−5) for all milk, 1.22 (1.06–1.41; p = 6.66 × 10−3) for whole milk, 1.32 (1.16–1.52; p = 4.33 × 10−5) for low-fat/skim milk, and 1.22 (1.00–1.50; p = 5.21 × 10−2) for cheese (Juhl et al. HKM, Miller IM, Jemec GBE, Kanters JK, Ellervik C, 2018).

**DISCUSSION**

Acne vulgaris is an inflammatory disorder of the pilosebaceous unit commonly occurring in adolescents (Mustafa, 2022). The prevalence of acne vulgaris in adolescents is higher in males, but in adults, it is higher in females. Boys have an increased prevalence from 40% at the age of 12 years to 95% at the age of 16 years, while girls experience an increase in prevalence at the same age from 61% to 83%. In Indonesia, the prevalence of acne vulgaris ranges from 80-85% in adolescents, with the peak incidence occurring at the age of 15-18 years, 12% in women over 25 years of age, and 3% at the age of 35-44 years. The course of acne vulgaris in most patients is self-limiting. However, residual symptoms can persist for a lifetime, with the formation of scar tissue and psychological disturbances, especially in young people (Kleinman et al., 2020).

The lesions of acne vulgaris typically manifest as widened follicles with keratin plugs. Widened follicles can lead to the formation of comedones more easily. When the thin follicular wall ruptures, bacteria and signs of inflammation emerge, causing traumatized acne lesions to develop into scar tissue.

The main sites of predilection for acne vulgaris are the face and neck (99%) and, to a lesser extent, the back (60%), chest (15%), as well as the shoulders and upper arms. Acne vulgaris lesions on the trunk are near the midline (10) (Nagiash et al., 2023). Acne vulgaris is characterized by several types of lesions: non-inflammatory lesions (open or closed comedones) and inflammatory lesions (papules, pustules, or nodules) (Jusuf et al., 2020). The majority of inflammatory lesions appear to originate from comedones (54%), while a significant number of inflammatory lesions (26%) arise from normal skin (Firlej et al., 2022).

Acne vulgaris is a multifactorial inflammation resulting from internal and external factors (Primawati et al., 2022). Factors that influence the development of acne vulgaris include genetics, hormones, diet, medication use, occupation, pollution, climate, and lifestyle. Many food components, from specific micronutrients to entire macronutrients, have been proposed to positively and negatively affect acne vulgaris. A
Western-style diet, characterized by a high intake of high-protein products, has been shown to affect hormone levels involved in the pathogenesis of acne vulgaris (Parker et al., 2022). The protein contained in milk is divided into two, namely casein, which is responsible for thickening milk, and whey protein, which is the liquid part of milk. Sports practitioners and athletes widely use whey protein because it plays a role in protein synthesis, increasing muscle mass, and in carbohydrate metabolism to enhance athletic performance.

The amino acids that makeup whey protein are mainly branched-chain amino acids (BCAA), which also contain bioactive peptides such as Beta-Lactoglobulin (BLG) that are resistant to acid and enzymes in the stomach to support absorption in the intestine. Peptides with the highest BCAA content are Alpha-Lactalbumin (aLA), which has the highest tryptophan content among all easily and quickly digestible protein food sources, as well as antimicrobial activity that protects organisms against pathogenic bacteria. The protein requirements of an athlete can be increased from 1.2 - 2 g/kg body weight above the protein requirements of the general population, which is 1-1.2 g/kg body weight (Howard et al., 2023). An athlete needs increased protein requirements to support proteolysis during exercise, so consuming whey protein can support this goal. However, consuming whey protein for 2 months can cause acne vulgaris lesions due to insulin-like growth factor 1 (IGF-1) contained in whey protein that can stimulate the formation of sebum that causes acne vulgaris.

Milk protein contains both whey and lactoferrin, a derivative of iron-binding protein that has antibacterial and anti-inflammatory effects, thus reducing the incidence of acne vulgaris (Niaz et al., 2019). Protein that can reduce the occurrence of acne vulgaris can also be found in collagen, which plays a role in improving skin elasticity and moisture, thus reducing the occurrence of acne. According to Simonart's research, consuming whey protein concentrate can cause acne vulgaris. There is pathophysiological solid evidence that whey protein can stimulate acne development. Products based on whey protein contribute to postprandial insulin increase and basal plasma IGF-1 levels, which activate the phosphoinositide-3 kinase/Akt pathway, thus reducing the nuclear content of the FoxO1 transcription factor that acts as the primary regulator of acne, leading to FoxO1 deficiency as the main factor in acne pathogenesis through androgen receptor activation, comedogenesis, increased sebaceous lipogenesis, and follicular inflammation.

CONCLUSIONS

Based on these results, it can be concluded that consuming protein milk affects the occurrence of acne vulgaris. Searching various sources such as journals, and relevant articles in the last 5 years shows that there is a significant relationship between protein consumption and the occurrence of acne vulgaris in teenagers due to the increase in sebum that occurs due to increased IGF-1. Further research needs to be done by considering confounding factors affecting the results. In addition, it is recommended that future researchers collect protein consumption data by considering the type of protein consumed so that the data obtained is more accurate. Future studies should also consider more even respondent age distributions up to adulthood to represent a more realistic and comprehensive picture of acne vulgaris occurrence.

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