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The Nexus of Home Sanitation, Personal Hygiene, and Dermatitis: Evidence from Banjarmasin, Indonesia

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Abstract Dermatitis is a prevalent skin condition that can significantly impact the quality of life. While various factors contribute to its development, personal hygiene and environmental sanitation roles have been increasingly recognized. This study explored the relationship between personal hygiene practices, environmental sanitation factors, and dermatitis incidence in Banjarmasin City, Indonesia. A cross-sectional survey was conducted with 62 respondents, assessing multiple aspects of personal hygiene (hand, foot, nail, and skin cleanliness) and environmental sanitation (waste disposal and water quality). Data were collected through structured questionnaires and observational checklists, followed by statistical analysis using chi-square tests. Results revealed that a substantial proportion of respondents exhibited poor hygiene practices, with 53.2% demonstrating inadequate hand hygiene, 48.4% showing poor foot and nail cleanliness, and 46.8% displaying suboptimal skin hygiene. Environmental factors were also concerning, with 61.3% of respondents having inadequate wastewater disposal facilities and 62.9% facing poor waste management systems. Statistical analysis indicated significant associations between these factors and dermatitis incidence ($p < 0.05$), with poor personal hygiene and inadequate environmental sanitation strongly correlated with higher rates of dermatitis. These findings underscore the importance of improving personal hygiene practices and environmental sanitation measures in reducing dermatitis incidence and promoting overall skin health. The study contributes to the growing body of evidence linking hygiene and environmental factors to dermatological conditions, offering valuable insights into public health interventions. However, limitations include the relatively small sample size and the focus on a single urban area, which may limit generalizability. Future research should consider more significant, diverse populations and longitudinal designs to establish causal relationships. Practical implications include the need for targeted education programs on proper hygiene practices and advocacy for improved urban sanitation infrastructure. From a social perspective, addressing these issues could significantly improve community health and well-being, particularly in rapidly developing urban areas facing sanitation challenges.

Keywords Dermatitis, Personal Hygiene, Environmental Sanitation, Banjarmasin City, Skin Health

1. Introduction

Dermatitis is a skin disease caused by inflammation and irritation, resulting in itchy skin [1]. One contributing factor to dermatitis is poor home sanitation. Home sanitation includes adequate clean water, waste disposal facilities (latrines), waste disposal systems, and garbage disposal facilities. Poor home sanitation is also a key factor supporting the development of dermatitis [2]. Yulianti [3] found a relationship between clean water facilities, healthy latrines, and garbage disposal facilities and the incidence of dermatitis.

Personal hygiene conditions can influence human health levels, comprising components such as hand, foot, nail, and skin cleanliness and the cleanliness of clothing and towels. Safitri et al. [2] showed a significant relationship between personal hygiene and the incidence of dermatitis, including skin cleanliness, towel cleanliness, and the cleanliness of beds and sheets [4]. Ayukhaliza [5] showed that significant results were obtained that there is a relationship between personal hygiene and the incidence of dermatitis, including clothing cleanliness (p-value = 0.032), skin cleanliness (p-value = 0.012), towel cleanliness (p-value = 0.024), and bed cleanliness (p-value = 0.009).

According to the World Health Organization, dermatitis affected around 230 million people globally in 2010, or 3.5% of the world population. The prevalence of dermatitis is dominated by females, particularly in the reproductive age group of 15-49 years [1]. According to data from the Indonesian Ministry of Health, the prevalence of dermatitis in Indonesia is relatively high (67.8%); the highest rate is in South Kalimantan Province (11.3%) and the lowest in West Sulawesi Province (2.57%) [6]

The Indonesian Ministry of Health released the development of skin diseases suffered by the Indonesian population in the 2015 health profile of Indonesia. The report showed skin diseases ranked among the top three, with the highest number of outpatient visits in Indonesia. There were 192,414 visits, with 122,074 new cases and 70,338 old cases [7]. Based on data from the Banjarmasin City Health Department, dermatitis has been among the top ten most common diseases in Banjarmasin over the past three years, with 7,584 cases in 2020, 5,543 cases in 2021, and 8,955 cases in 2022. This study aims to determine the relationship between home sanitation and personal hygiene with the incidence of dermatitis in Banjarmasin [8].

2. Methods

This research utilized an analytical case-control design to examine the prevalence of dermatitis in Banjarmasin. A total of 62 participants were involved, split evenly into 31 cases (individuals diagnosed with dermatitis) and 31 controls (those without the condition). Participants were recruited from the Pasar Lama and Antasan Besar sub-districts between January and April 2024. All participants were residents of the study area, with cases identified as individuals having a confirmed dermatitis diagnosis, while controls were healthy individuals from the same region. Selection was conducted using a simple random sampling method through a lottery system. The study investigated various home sanitation factors, including access to clean water, waste disposal facilities, wastewater management, and garbage disposal practices, as well as personal hygiene aspects such as the cleanliness of hands, feet, nails, skin, and the hygiene of clothing and towels. These factors were considered independent variables, while the occurrence of dermatitis was the dependent variable. Data collection involved structured questionnaires, observational checklists, and verification of medical records. Chi-square tests were employed to analyze the relationships between the variables, with a confidence level established at 95%. The odds ratio will be used to show the measure of association in a case-control study design, indicating the likelihood of exposure between the disease cases compared to the controls [9].

Future research could enhance the validation of self-reported hygiene practices by integrating observational assessments, such as home visits to evaluate hygiene conditions with standardized checklists. Additionally, photo-documentation and secondary data from health records or environmental monitoring agencies could offer further verification. The use of wearable technology to track behaviours like handwashing frequency would provide objective measurements, while longitudinal follow-ups could capture real-time data and reduce recall bias. Combining surveys with qualitative interviews could further substantiate self-reports, and refining questionnaires through pilot testing could ensure clarity.

3. Results and Discussion

This study had 62 respondents who suffered from dermatitis within the past year and lived in Banjarmasin, specifically in the Pasar Lama and Antasan Besar sub-districts.

3.1. Characteristics of Respondents Based on Age and Gender

Most respondents with dermatitis and those without it were aged 51-60 years, with six respondents (19.3%) and 71-80 years, with six respondents (19.3%) in the case group. Most respondents in the control group were aged 41-50 years, with seven respondents (22.5%). The minority of respondents aged 61-70 years consisted of 1 respondent (3.22%) in the case group. The minority of respondents aged 1-10 years and 71-80 years each had two respondents (6.45%) in the control group. Most respondents with dermatitis and those without it in Banjarmasin were female, with 21 respondents (67.8%) in the case group and 24 respondents (77.4%) in the control group. Male respondents comprised 10 (32.2%) in the case group and 7 (22.5%) in the control group.

3.2. Clean Water Provision

The observation results showed that most respondents' homes, both those with and without dermatitis, had adequate clean water, with 52 respondents (83.9%) meeting the criteria and ten respondents (16.1%) not meeting the criteria. Access to clean water is essential for minimizing the risk of waterborne illnesses and enhancing general hygiene. This availability is likely linked to improved health outcomes, which may include a decrease in skin issues like dermatitis. Nevertheless, the 16.1% of respondents lacking sufficient water access indicates a significant gap that requires attention. Providing clean water for everyone can result in considerable advancements in community health, especially for at-risk groups. Focused initiatives should aim at improving infrastructure and reaching out to those without adequate access, thereby promoting healthier living environments.

3.3. Waste Disposal Facilities (Latrines)

The observation results indicated that most respondents' homes needed to meet the criteria for adequate waste disposal facilities, with 33 respondents (53.2%) not meeting the criteria and 29 respondents (46.8%) meeting the criteria. The findings indicate that approximately 53.2% of households do not have sufficient waste disposal facilities, which may result in significant challenges, including heightened health risks, inadequate hygiene, and environmental pollution. This highlights an immediate need for action to enhance waste management systems in these regions. Conversely, the 46.8% of households that do meet the necessary standards show that progress is achievable, and focused initiatives could further raise this percentage, thereby enhancing public health and overall living conditions for the community.

3.4. Wastewater Disposal Systems

The observation results showed that most respondents' homes did not meet the criteria for adequate wastewater disposal systems, with 38 respondents (61.3%) not meeting the criteria. The practical implications of this finding reveal a critical concern, as 61.3% of respondents lack sufficient wastewater disposal systems. This indicates that a large portion of households may be disposing of wastewater in unsafe or unsuitable manners, posing significant public health threats, including waterborne illnesses, contamination of local water supplies, and environmental harm. This situation underscores the urgent need for improvements in wastewater disposal systems to ensure that a greater number of households comply with essential standards. Tackling this issue would enhance sanitation, promote healthier living conditions, and improve the overall well-being of the community.

3.5. Garbage Disposal Facilities

The observation results indicated that most respondents' homes needed to meet the criteria for adequate garbage disposal facilities, with 39 respondents (62.9%) not meeting the criteria. The practical implications of this discovery indicate that a considerable segment of the population (62.9%) does not have access to adequate waste disposal facilities. This deficiency can result in various challenges, including waste accumulation, foul odors, and a heightened risk of pests and diseases. Additionally, improper waste disposal exacerbates environmental pollution and can deteriorate local living conditions. This situation underscores the urgent requirement for enhancements in waste management systems and increased public awareness to guarantee that more households can utilize proper garbage disposal facilities. Tackling this issue would significantly enhance sanitation, public health, and environmental sustainability within the community.

3.6. Analysis of the Relationship between Home Sanitation and Personal Hygiene with the Incidence of Dermatitis in Banjarmasin

The results, analyzed using the Chi-square test, show the relationship between home sanitation and personal hygiene and the incidence of dermatitis in Banjarmasin (Table 1).

The findings of the study underscore the importance of home sanitation and personal hygiene in mitigating the occurrence of dermatitis in Banjarmasin. The Chi-square analysis revealed several critical factors that are closely linked to the prevalence of dermatitis. In particular, the condition of waste disposal facilities (latrines), wastewater management, garbage disposal, and the cleanliness of hands, feet, nails, skin, clothing, and towels all exhibited statistically significant correlations with dermatitis. This indicates that inadequate sanitation and hygiene practices in these domains are contributing to elevated dermatitis rates within the community.

From a practical standpoint, enhancing sanitation infrastructure—such as waste and wastewater management systems—and encouraging improved personal hygiene practices, including regular hand washing, appropriate skin care, and maintaining clean clothing and towels, could significantly lower the incidence of dermatitis. Public health initiatives targeting these aspects are likely to have a profound effect on enhancing skin health and overall well-being in Banjarmasin.

Table 1. Research Results

No	Research Variable	Chi-Square Test Analysis	Interpretation of Results
1	Clean Water Provision vs Dermatitis	p = 0,084 > α = 0,05	There is no relationship between clean water provision and the incidence of dermatitis in Banjarmasin
2	Waste Disposal Facilities (Latrines) vs Dermatitis	p = 0,042 < α = 0,05	There is a relationship between waste disposal facilities (latrines) and the incidence of dermatitis in Banjarmasin
3	Wastewater Disposal vs Dermatitis	p = 0,019 < α = 0,05	There is a relationship between wastewater disposal and the incidence of dermatitis in Banjarmasin
4	Garbage Disposal vs Dermatitis	p = 0,035 < α = 0,05	There is a relationship between garbage disposal and the incidence of dermatitis in Banjarmasin
5	Hand Cleanliness vs. Dermatitis	p = 0,042 < α = 0,05	There is a relationship between hand cleanliness and the incidence of dermatitis in Banjarmasin
6	Foot and Nail Cleanliness vs Dermatitis	p = 0,022 < α = 0,05	There is a relationship between foot and nail cleanliness and the incidence of dermatitis in Banjarmasin
7	Skin Cleanliness vs Dermatitis	p = 0,042 < α = 0,05	There is a relationship between skin cleanliness and the incidence of dermatitis in Banjarmasin
8	Clothing Cleanliness vs Dermatitis	p = 0,005 < α = 0,05	There is a relationship between clothing cleanliness and the incidence of dermatitis in Banjarmasin
9	Towel Cleanliness vs Dermatitis	p = 0,022 < α = 0,05	There is a relationship between towel cleanliness and the incidence of dermatitis in Banjarmasin.

4. Discussion

4.1. Provision of Clean Water

Clean water that meets the standards involves providing quality water resources that satisfy quality, quantity, and continuity requirements. Water quality must adhere to physical standards such as being odorless, tasteless, colorless, and suitable for daily needs without interruption [10]. Water sanitation facilities include infrastructure and equipment that produce, provide, and distribute clean water to the community, sourced from PDAM, wells, pumps, rainwater reservoirs, springs, and pipelines.

Based on the study, 74.2% of respondents had clean water provision that met the standards. Physical observations in 62 households showed that 74.2% had colorless, tasteless, and odorless water, meeting the physical requirements for clean water. Statistical tests indicated no significant relationship between clean water provision and dermatitis incidence in Banjarmasin, with $p = 0.084 > \alpha = 0.05$. In the case group, 74.2% had standard-compliant water facilities, while 93.5% met the standards in the control group.

Clean water facilities are crucial in bathroom sanitation, impacting dermatitis transmission as dermatitis is a water-washed disease. Insufficient clean water, both in quality and quantity, prevents effective personal hygiene, potentially leading to dermatitis. Poor-quality water may cause secondary infections in dermatitis patients, prolonging healing [6]. This study aligns with Amelia's (2019) research, which found no relationship between clean water and dermatitis complaints in children at Al-Hidayah Orphanage, Mataram, with p-value = $0.725 > \alpha = 0.05$. The case-control study in Banjarmasin similarly found no significant relationship between clean water facilities and dermatitis incidence.

4.2. Waste Disposal Facilities (Latrines)

Healthy latrine facilities are vital for human health. According to WHO, sanitation involves providing facilities and services for human waste disposal, including urine and feces. A healthy latrine meets construction and sanitation requirements [3]. Human waste, including feces, urine, and CO_2, must be disposed of properly to prevent complex disease transmission.

The study found that 53.2% of respondents had latrines that did not meet standards. Physical observations in 62 households revealed issues such as a lack of water closets, unstable construction, absence of septic tanks, missing goosenecks, non-waterproof and slippery floors, water puddles, and no drainage holes. Statistical tests showed a significant relationship between latrine facilities and dermatitis incidence in Banjarmasin, with $p = 0.042 < \alpha = 0.05$. In the case group, 53.2% of latrine facilities were non-compliant, while 46.8% met the standards in the control group.

Latrine use is crucial for sanitation, as improper waste disposal can contaminate the environment, especially soil and water sources. Open latrines accessible to vectors can indirectly contaminate food and water. Family latrines are necessary for safe feces disposal and for preventing disease transmission [11]. Marniati et al. [12] research, found a relationship between latrine facilities and dermatitis complaints in children at Al-Hidayah Orphanage, Mataram, with a statistical result of p-value = $0.002 < \alpha = 0.05$.

4.3. Waste Disposal Facilities

The provision of wastewater drainage systems is a crucial aspect of sanitation. These systems comprise safe drainage and storage facilities for wastewater from bathrooms, kitchens, and washing areas to prevent stagnant water, which can lead to environmentally based diseases such as dermatitis [13]. Inadequate wastewater disposal can create breeding grounds for disease vectors like mosquitoes, microorganisms, and pathogens, leading to dermatitis and other health issues. It can also cause unpleasant odors and visual pollution, contaminating surface water [3], [14].

The study indicated that 61.3% of respondents had inadequate wastewater disposal facilities, while 38.7% had adequate facilities. A chi-square statistical test showed a significant relationship between wastewater disposal facilities and dermatitis incidence in Banjarmasin, with $p = 0.019$ ($p < \alpha = 0.05$). Safe wastewater disposal systems, including drains from bathrooms, kitchens, and washing areas, are essential to avoid stagnant wastewater that poses environmental risks. Wastewater from households, industries, groundwater, surface water, and other sources should be appropriately managed to prevent health hazards [15].

This research found a significant relationship between wastewater disposal facilities and dermatitis incidence at Al-Kautsar Modern Islamic Boarding School, Simalungun, with a p-value of $0.002 < \alpha = 0.05$. That study found no relationship between wastewater disposal systems and dermatitis in children with a p-value of $0.725 > \alpha = 0.05$ [16].

Field observations revealed that wastewater disposal systems in Banjarmasin do not meet the requirements, with many households needing proper drainage systems, leading to open drainage. Open wastewater systems can negatively impact the community. Untreated wastewater can cause health issues, environmental degradation, and property damage, necessitating proper wastewater management [17]. Untreated wastewater can harbor pathogenic microbes, posing a risk of waterborne diseases and serving as breeding grounds for disease vectors. Proper handling of wastewater is crucial to prevent these health hazards. The study confirms a significant relationship between Banjarmasin's wastewater disposal facilities and dermatitis incidence.

4.4. Waste Disposal Facilities

Garbage, particularly biodegradable waste, serves as a food source for flies and rodents [18]. Poor household waste management can create breeding grounds for disease vectors like insects and rodents, leading to environmental health issues [19]. Proper waste management is essential to prevent these health risks.

The study found that 62.9% of respondents had inadequate waste disposal facilities, while 37.1% had adequate facilities. A chi-square statistical test showed a significant relationship between waste disposal facilities and dermatitis incidence in Banjarmasin, with $p = 0.035$ ($p < \alpha = 0.05$). This research found a significant relationship between waste disposal facilities and dermatitis complaints in the Indrapura Public Health Center area, Batubara Regency, with p-value of $0.042 < \alpha = 0.05$ [16]. The study revealed that some respondents still used non-compliant waste bins, such as non-waterproof and uncovered bins, contributing to dermatitis occurrence. Inadequate waste disposal can lead to insect and animal infestations, causing soil and air pollution and health issues like dermatitis. Proper waste management practices are essential to prevent these environmental and health hazards [20].

4.5. Hand, Foot, Nail, and Skin Hygiene

Hand hygiene involves removing dirt and microorganisms from hands using soap and running water or alcohol-based antiseptics. Hand hygiene is crucial for health and should be instilled in every individual. Cleaning feet and nails, including the spaces between toes, using soap and water at specific times, such as before bed and after outdoor activities, and trimming nails are also essential for preventing diseases. Dirty feet and nails can lead to contamination and various diseases [21].

The study found that 53.2% of respondents had poor hand hygiene, while 46.8% had good hand hygiene based on interviews with 62 respondents. Similarly, 48.4% had poor foot and nail hygiene, while 51.6% had good hygiene. Additionally, 46.8% had poor skin hygiene, while 53.2% had good skin hygiene. Chi-square statistical tests confirmed a significant relationship between hand, foot, nail, and skin hygiene and the incidence of dermatitis in Banjarmasin.

Hand hygiene requires special attention in personal hygiene practices, as hands are vulnerable to various infections. Proper hand care is essential for people of all ages and becomes increasingly important with age and during illness [22]. Skin hygiene involves regularly cleaning the entire body with soap and water, especially when dirty. Bathing at least twice daily using soap is a fundamental practice for maintaining personal cleanliness, particularly skin hygiene [21].

Hapsari's [23] research found a significant relationship between hand hygiene and the incidence of irritant contact dermatitis among scavengers. Marniati et al.'s [24] study also indicated a significant relationship between foot and nail hygiene and dermatitis complaints in the Indrapura Public Health Center area.

The study observed respondents who did not wash their feet after outdoor activities and did not trim their nails weekly, leaving them long. Scratching the body with long nails can cause infections and lead to dermatitis. Ivanda's [21] research also highlighted a significant relationship between skin hygiene and dermatitis complaints. Inadequate skin hygiene practices, including infrequent bathing, have been associated with an increased risk of skin irritation and conditions such as dermatitis [7], [10], [25], [26].

The results reveal significant hygiene issues that may pose health risks to the community. A considerable number of participants report experiencing dermatitis, which is likely linked to insufficient hygiene habits. More than half of those surveyed face challenges with maintaining proper hand cleanliness, thereby increasing their vulnerability to infections. Additionally, nearly half of the respondents exhibit poor foot hygiene, which could lead to fungal infections, while skin hygiene remains a concern for almost half of the population. The uncleanliness of clothing and towels may also contribute to skin irritation. These findings underscore the critical need for enhanced access to clean water, improved sanitation facilities, and greater awareness of effective hygiene practices to mitigate health risks.

4.6. Cleanliness of Clothing and Towels

Cleanliness of clothing and towels involves regularly washing clothes with soap and water after they have been worn or become dirty. Clothing absorbs sweat and dirt excreted by the skin, and since it comes into direct contact with the skin, dirty and sweaty clothes can become breeding grounds for bacteria, leading to unpleasant odors [27]. Proper clothing hygiene involves changing clothes after bathing and outdoor activities, washing them thoroughly with soap or detergent, drying them in sunlight, and ironing them [28]. Towels are used to dry the body after bathing. This process transfers residual water and dead skin cells onto the towel, making it damp and a potential habitat for germs and bacteria. Consequently, the body may get exposed to these pathogens, causing skin diseases. Maintaining towel hygiene includes using personal towels and washing them weekly [29].

The study found that 48.4% of respondents had poor clothing hygiene, while 51.6% had good clothing hygiene. Similarly, 51.6% had poor towel hygiene, while 48.4% had good, based on interviews with 62 respondents. Statistical tests confirmed a significant relationship between clothing and towel hygiene and the incidence of dermatitis in Banjarmasin.

A Mawadirussalam Islamic Boarding School study found a significant relationship between towel hygiene and dermatitis incidence [30]. Misra et al. [31]) study also found a relationship between towel cleanliness and skin diseases, showing that towels not dried in sunlight after use could cause dermatitis due to the humid environment that fosters bacteria. The research highlighted a significant relationship between clothing hygiene and dermatitis complaints. It showed that not changing clothes after activities could allow bacteria to proliferate, leading to itchy skin and, ultimately, dermatitis [23], [32].

The practical implications of this discovery indicate that inadequate hygiene of clothing and towels is a direct factor in the development of skin conditions such as dermatitis. With nearly half of the participants indicating poor clothing hygiene and a similar number reporting inadequate towel hygiene, this points to a significant risk of skin infections and irritation within the community. Unclean clothes and towels can serve as breeding grounds for bacteria, which can lead to dermatitis, particularly when clothing is not changed frequently or towels are not laundered properly. To mitigate this issue, enhancing access to laundry services, encouraging the regular washing of clothes and towels, and educating individuals on the benefits of drying towels in sunlight could be effective strategies to reduce skin-related health problems. By promoting better hygiene practices in these areas, the incidence of skin diseases can be significantly decreased, leading to improved overall health outcomes.

5. Conclusions

Our findings indicated that although 83.9% of respondents have access to clean water that meets standards, a substantial number need more sanitary facilities. Specifically, 53.2% lack suitable latrines, 61.3% lack sufficient wastewater disposal systems, and 62.9% need proper rubbish disposal facilities. Regarding personal hygiene, 53.2% exhibited inadequate hand hygiene, 46.8% inadequate skin hygiene, and 51.6% inadequate towel hygiene. Conversely, 51.6% exhibited proper foot and nail care, while the identical percentage demonstrated adequate garment hygiene.

Statistical tests revealed no significant correlation between the provision of clean water and the occurrence of dermatitis. Notable correlations were identified between dermatitis and other factors: waste disposal facilities, wastewater disposal systems, garbage disposal methods, hand cleanliness, foot and nail hygiene, skin hygiene, garment hygiene, and towel hygiene.

Although these findings indicate a possible correlation between specific sanitation and hygiene parameters and dermatitis within the research group, it is essential to interpret these results with caution. The study's restricted sample size and emphasis on particular sub-districts limit the applicability of these findings to the broader Banjarmasin community. Furthermore, dermatitis is a multifaceted disorder affected by numerous factors not addressed in this study, such as genetic susceptibility, environmental allergens, and occupational exposures.

This study offers significant initial insights into possible environmental and behavioral factors associated with dermatitis in an urban Indonesian. Nonetheless, it emphasizes the need for more extensive, large-scale research to address dermatitis's complex nature. Subsequent research should examine a more comprehensive array of potential risk variables and their interrelations.

Enhancing cleanliness and advocating for proper hygiene practices may aid in improving skin health; nevertheless, they likely constitute just one facet of a multifaceted strategy required to prevent and manage dermatitis effectively. Public health interventions must acknowledge this complexity by integrating enhancements in living conditions with additional preventive strategies and treatment alternatives. These findings provide a foundation for comprehending the interplay between environmental factors, personal habits, and dermatitis in Banjarmasin; however, additional study is essential to formulate comprehensive methods for preventing and managing dermatitis in this context.

Future studies ought to utilize longitudinal designs that track participants across several seasons and years to gain a deeper insight into the timeline from exposure to the onset of disease. These investigations could pinpoint essential periods for intervention and enhance the development of preventive measures.

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Conflict of Interest

The authors declare that the research was conducted without commercial or financial relationships that could create a conflict of interest.

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