

also developed by scimago:

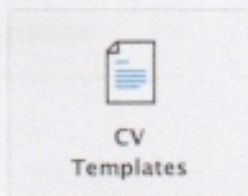
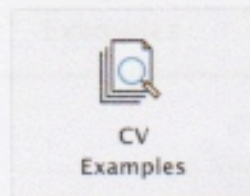
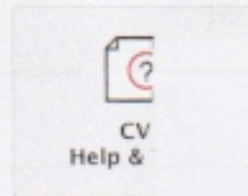


SCIMAGO INSTITUTIONS RANKINGS

SJR

Scimago Journal & Country Rank

Enter Journal Title, ISSN or Publisher Name

[Home](#)[Journal Rankings](#)[Country Rankings](#)[Viz Tools](#)[Help](#)[About Us](#)CV
TemplatesCV
ExamplesCV
BuilderCV
Help &[resume.io](#)

Journal of Advanced Research in Dynamical and Control Systems


Country	United States - SIR Ranking of United States
Subject Area and Category	Computer Science Computer Science (miscellaneous) Engineering Engineering (miscellaneous)
Publisher	Institute of Advanced Scientific Research
Publication type	Journals
ISSN	1943023X
Coverage	2009-2015, 2017-2020


17


H Index


Scope Journal of Advanced Research in Dynamical and Control Systems is a multidisciplinary journal. It publishes papers focusing on proofs of important theorems as well as papers presenting new ideas and new theory, conjectures, numerical algorithms and physical experiments in areas related to nonlinear dynamics and systems theory. Papers that deal with theoretical aspects of nonlinear dynamics and/or systems theory should contain significant mathematical results with an indication of their possible applications. Papers that emphasize applications should contain new mathematical models of real world phenomena and/or description of engineering problems. They should include rigorous analysis of data used and results obtained. Papers that integrate and interrelate ideas and methods of nonlinear dynamics and systems theory will be particularly welcomed.

[Homepage](#)[How to publish in this journal](#)[Contact](#)[Join the conversation about this journal](#)


CV
Templates


CV
Examples


CV
Builder


CV
Help & Tips

 resume.io

Quartiles +



SJR +



Citations per document +



Total Cites Self-Cites +



External Cites per Doc Cites per Doc +



% International Collaboration +



Citable documents Non-citable documents +

Cited documents Uncited documents +



Journal of Advanced Research in Dynamical and...

Q3 Engineering (miscellaneous) best quartile

SJR 2019 0.13

powered by scimagojr.com

Show this widget in your own website

Just copy the code below and paste within your html code:

ca href="https://www.scimagojr.com



CV Templates



CV Examples



CV Builder



CV Help & Tips

resume.io



Loading comments...

Developed by:



Powered by:



Follow us on @ScimagoJR

Scimago Lab, Copyright 2007-2020. Data Source: Scopus®

EST MODUS IN REBUS

Wander | Sadre | 1 x 100

The Relationship between Drinking Water Consumption and Sebum Level with Face Skin Wrinkle of Woman at *Gereja Batak Karo Protestant*

Ago Harlim, Agita Gloria

Medical Faculty, *Universitas Kristen Indonesia*, Jakarta

Corresponding Author: agoharlim@yahoo.com

Abstract

Face skin wrinkles are folds or creases that form under the skin layer. The process of forming skin wrinkles is not known, but there are intrinsic and extrinsic factors that can affect the formation of skin wrinkles. This study aims to determine whether there is any correlation between the amount of drinking water consumption and sebum levels with the level of facial skin wrinkles. This study used observational analytic with a cross-sectional study design method, with 66 respondents as female congregants from the *Gereja Batak Karo Protestan*, age between 50-60 years. Before the skin examination, the respondents measured the water consumption in one day with a 500 mL drinking bottle for 3 consecutive days than record the results. In this study, Dermoprime Viso was used as a skin analyzer to determine the level of sebum and the level of facial skin wrinkles of the respondents. Besides, Spearman and Kruskal Wallis were used for statistical assessment purposes. The study results found that there are significant correlations between the amount of drinking water consumption and sebum levels with the level of skin wrinkles.

Keywords: *Face Skin Wrinkles, Sebum, Water*

I. INTRODUCTION

The skin is the largest organ in the human body, which is about 15% of an adult's body weight. The skin functions as a body protector from environmental exposure namely ultraviolet (UV), chemical and physical trauma, and microorganisms. Besides, the skin also functions to prevent dehydration, regulate body temperature, and can regenerate itself [1;2;3]. The skin is the outermost layer of the body and is constantly exposed to stimuli from the environment [4]. As we get older, the skin will share the ageing process which causes the skin to become thinner, dry, wrinkled, and there is uneven pigmentation [5;6].

Wrinkles are wrinkles or curves that form on the bottom surface of the skin. Towards the age of the third decade, the skin begins to experience structural changes and fine wrinkles begin to appear. Skin wrinkles are measured in depth and width, wrinkles less than 1 mm are classified as fine wrinkles. And wrinkles more than 1 mm are classified into deep wrinkles. Wrinkles on the facial skin, arms and hands are easily observed, so research is often done on these parts [7;8]. According to a 2009 Gover study found that most in diseases related to skin aged 60-70 years are skin wrinkles that are 95.5%. The most wrinkled locations are the areas of the skin that are often exposed to sunlight, namely the face, neck, lower limbs and back of the hands [9;10].

The process of the formation of skin wrinkles is not known with certainty, because many factors affect. Based on research, it is known that skin wrinkles are influenced by two interrelated factors namely internal factors and external factors [11;12]. The shape and function

of the skin are maintained by the balance of water content in the stratum corneum (SC) and skin surface lipids (SSL) in the epidermis [3;13].

In SC, if dehydration can cause fine wrinkles on the skin, but it happens reversibly and can be treated with fluid rehydration. In general, many statements that the consumption of adequate and regular drinking water will make the skin moist and prevent wrinkles. A research was conducted to a prospective study of a group of healthy people who consumed 2.25 L of mineral water or tap water for 4 weeks. From the results of his research stated that an increase in water content in the epidermis, the skin looks smoother and increased skin density [9;14;15]. The consumption of adequate drinking water can increase levels of humidity in SC [10;16]. As for SSL, it is formed from sebum produced by sebaceous glands [17;18]. Radiation from the sun can accelerate the process of formation of skin wrinkles. One function of sebum is as photoprotection from UV radiation, to reduce direct exposure to sunlight [19; 20].

Based on this, the researcher is interested in finding out whether there is a relationship between the amount of drinking water consumption and sebum levels to the level of skin wrinkles in the female congregation of the *Gereja Batak Karo Protestan* (GBKP).

II. RESEARCH METHOD

The design of this study was an observational analytical study using a cross-sectional study design, with the scope of Skin Health and Gender Sciences. The scope of the research location is the *Pondok Gede Ruggun GBKP* congregation. When the research was conducted in November - December 2019. The population in this study was the *GBKP* female congregation and the sample used in this study was a portion of the *GBKP* female congregation aged 50-60 years. The sampling of this research used total sampling technique. The research tools used in this study were questionnaires, 500 mL drinking bottles, and skin examination tools using the Skin Diagnostic System: Dermaprime viso. Dermoprime Viso is a measuring tool that automatically makes a diagnosis for the skin. This tool is equipped with a camera's optical lens, LED lights, skin moisture sensor, algorithm calculation, and Artificial Intelligence (AI) system. The Dermoprime Viso device can measure moisture, pores, skin wrinkles, skin pigmentation, keratin and skin types (sebum). The amount of drinking water consumption in 1 day is as follows, Less (<2 L), Enough (2-2.5L) and Lots (> 2.5L).

III. RESULT AND DISCUSSION

The results of research data conducted in November - December 2019, will be analyzed using the SPSS program or software version 16.0, by testing the results of the univariate analysis using descriptive and bivariate using nonparametric correlation tests with the Spearman and Kruskal Wallis methods. The univariate analysis discusses the description and analysis of the description of the variables in the study. The results of the study obtained primary data, intending to determine the characteristics of the respondents in this study with the following results.

Table 1. Age Frequency of Respondents

Age (year)	Frequency	%
50	11	16.7
51	9	13.6
52	5	7.6
53	7	10.6
54	5	7.6
55	3	4.5
56	8	12.1
57	6	9.1
58	2	3.0
59	4	6.1
60	6	9.1
Total	66	100.0

Based on table 1, the description of the respondent's age is known, obtained all ages according to the inclusion criteria, namely female respondents aged 50-60 years. Of the 66 respondents the most number was 50 years old (16.7%) and the lowest number was at the age of 58 years (3%).

Table 2. Frequency of Drinking Water Consumption

Water Consumption	Frequency	%
Lack	0	0.0
Enough	26	39.4
High	40	60.6
Total	66	100.0

Based on table 2, obtained drinking water consumption data, that there are no respondents whose drinking water consumption is lacking, as many as 26 respondents (39.4%) consume enough drinking water, and high water consumption in the many categories is 40 respondents (60.6%).

Table 3. Frequency of Sebum Content by Skin Type

Skin Types	Frequency	%
Dry	14	21.2
Oily	42	63.3
Combination	10	15.2
Total	66	100.0

Based on table 3, 14 respondents (21.2%) had dry skin types, 42 respondents (63.3%) had oily skin types, and 10 respondents (15.2%) had combination skin types. From the data table above, it shows that the majority of respondents have oily skin types.

Table 4. Frequency of Wrinkles

Wrinkle Level	Frequency	%
Good	3	4.5
Fine Lines	35	53.0
Expression Lines	22	33.3
Deep Wrinkle	6	9.1
Total	66	100.0

Based on table 4, it was found that 3 respondents (4.5%) had wrinkle levels Good, 35 respondents (53.0%) had wrinkle levels of fine lines, 22 respondents had wrinkle levels Expression Lines, and 6 respondents had Deep Wrinkle levels. From the data table above shows that the majority of respondents have fine lines wrinkles. The bivariate analysis aims to determine the relationship between the independent variables (drinking water and sebum) with the dependent variable (skin wrinkles). To test the relationship between the two variables using a non-parametric test with the Spearman and Kruskal Wallis methods.

The Relationship between Drinking Water Consumption and the Skin Wrinkles Levels

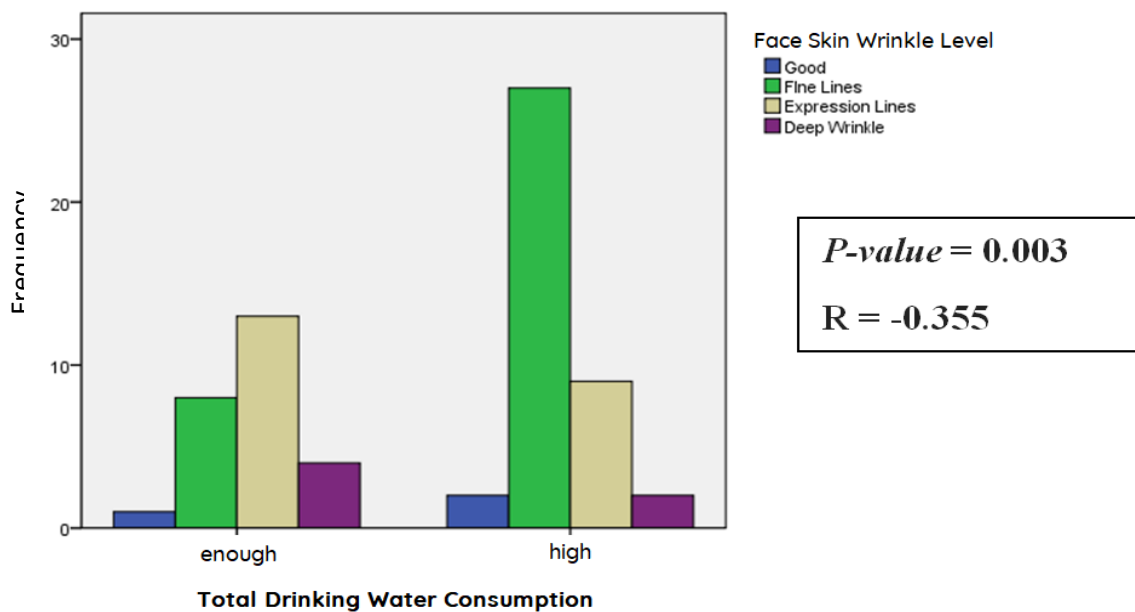


Figure 1. Drinking-Water Consumption and Skin Wrinkles Level

Based on figure 1, it is known that respondents who consume more drinking water tend to have better levels of wrinkles. The scale used for the variable amount of drinking water consumption and the level of skin wrinkles is the ordinal-ordinal scale because it was analyzed by the Kolmogorov-Smirnov normality test method first. Normality test results obtained a P-value of 0,000 in both drinking water data because the P-value <0.05 so that it can be concluded that the amount of drinking water data is not normally distributed. Then, it will proceed with the Spearman analysis test.

The relationship between Sebum Level based on Skin Type with the Face Skin Wrinkle Level

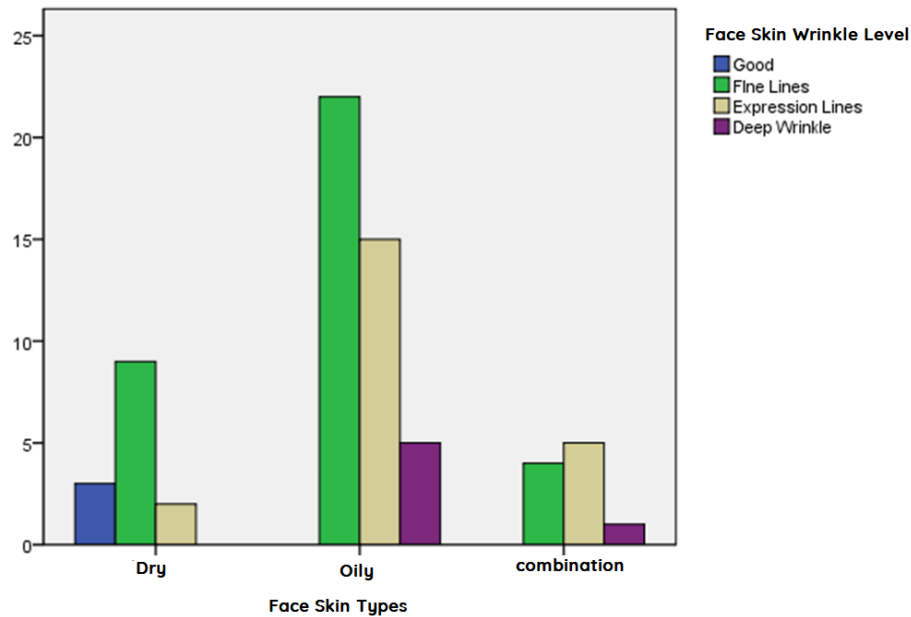


Figure 2. Sebum Frequency Based on Skin Type with the Face Skin Wrinkle Level

Based on figure 2, it is known that only respondents with dry skin type have good levels of skin wrinkles, as well as the deep wrinkle category only dry skin types that do not exist. When compared with oily and combination skin types. The scale used for variable skin type and level of skin wrinkles is a nominal-ordinal scale because it was analyzed by the Kolmogorov-Smirnov normality test method first. Based on the results of the normality test, a P-value of 0,000 was obtained for respondents with dry and oily skin types and a P-value of 0.035 for respondents for combination skin types. Because the P-value <0.05, it can be concluded that the three data are not normally distributed. Then it will be continued with the *Kruskal Wallis* analysis test.

Table 5. The Relationship of Sebum Level and Face Skin Type with Face Skin Wrinkles Level

Test	P-value	Result
The relationship of sebum level and face skin type with face skin wrinkles level	0.010	Significant

***Kruskal Wallis* Analysis Test, significant on $\leq p 0.05$**

From the results of the table above, we got the P-value of 0.010. Because the P-value <0.05, it can be concluded that there is a significant relationship between sebum levels based on skin type and the level of skin wrinkles. From the bivariate analysis selection results, the two independent variables P-value results <0.05, then can be entered into multivariate analysis.

Table 6. The Relationship between Drinking Water and Sebum with Face Skin Wrinkles Level

Variable	P-value
Drinking-Water Consumption	0.025
Sebum	0.019

Logistic regression test, significant at $\leq p 0.05$

The variable is said to be the most significant if the number of P-values is the smallest, so in this study, the most influential variable on the level of skin wrinkles is sebum because the P-value is 0.019.

In this study, univariate results did not get the amount of drinking water consumption that was lacking. Because the respondents that researchers get come from church congregations whose level of knowledge about drinking water consumption can be said to be good, and can also be connected with the level of education of respondents, namely the average high school education and S1 factors that help in terms of the level of consumption knowledge in addition to the level of education are employment status, family income, maternal nutrition knowledge, and health education. In this case, health education is intended to raise awareness, provide or increase community knowledge about the maintenance and improvement of health both himself, his family and the surrounding community [21;22].

The highest frequency of sebum content based on skin type is oily skin type. And based on the age of the respondents, the most were 50 years of age. These are interconnected because sebum production is related to age. Along with the increase, the production of sebum in the skin will decrease. Sebum production will decrease by 32% every 10 years in women, starting from the age of 50 years [23; 24;25]. Therefore, the results of the frequency of the level of wrinkles of respondents obtained the highest level of fine lines wrinkles. This can be attributed to the majority of respondents' skin types are oily skin types. Because, more levels of sebaceous glands can prevent the formation of dry skin and wrinkled skin [26;27].

The relationship between drinking water consumption with the face skin wrinkles level - In this study there is a relationship between the amount of drinking water consumption with the level of skin wrinkles. This result can also be linearly related to the research, which compares the skin condition of the respondent with the amount of drinking water consumed daily. In the results of the study, it was found that the level of hydration and biomechanical conditions of the skin condition of people who consume more drinking water is better when compared to people who consume less drinking water [23]. The skin condition will change to become smoother when skin moisture is maintained, this happens when there is an increase in drinking water consumption. So that through this research it can be seen, besides consuming enough drinking water can make the skin condition improve and smoother, consuming enough drinking water can also have a lower level of skin wrinkles [28; 29].

The manifestation of the ageing process in the form of wrinkled skin and lines, and the emergence of spots (patches on the skin). This is due to decreased production of type I collagen and increased extracellular matrix collagen fragmentation. Besides, in the elderly population, dry skin (xerosis cutis) is associated with loss of adipose tissue and a decrease in body fluids. Water content in ageing skin, especially the stratum corneum, is less than in younger skin [30;31;32]. Age-related changes in the composition of amino acids, besides, reduce the amount of skin NMF, thereby reducing the binding capacity of skin water. SC water levels, in particular,

progressively decrease with age, eventually dropping below the level needed for effective desquamation. Decreased desquamation process causes corneocytes to accumulate and adhere to the surface of the skin, resulting in rough, scaly, and scaly skin that accompanies xerosis in ageing skin [33;34;35].

The relationship between Sebum and face skin type with the face skin wrinkles level - The results of the study between sebum levels and skin types with the level of skin wrinkles are directly proportional. The association between sebaceous glands and the depth of wrinkles. Shallow wrinkles on the skin that contain more sebaceous glands, it can be one of the factors that prevent dry skin and prevent the formation of deep skin wrinkles [36;37].

In addition to the face, manifestations of skin ageing also occur in all skin in other areas. Some clinical manifestations that often interfere with skin ageing are pruritus senilis, actinic keratosis, seborrheic keratosis, and lentigo solaris. Senile pruritus or itching complaints in old age are mainly caused by dry skin syndrome or often called xerosis cutis [38;39]. The incidence rate in the elderly is reported to be 30-75%, due to the influence of skin ageing which causes a decrease in the ability to maintain skin moisture, increase transepidermal water loss (TEWL), decrease sweat and sebum production, and decrease the factors that maintain skin moisture. Some extrinsic factors can also trigger, including low air humidity, excessive bathing habits, the use of irritative soaps, the use of clothes that are irritative, and the use of alcohol and acetone on the skin. Clinical features include the appearance of dull and rough skin that is sometimes accompanied by squama, and complaints of itching [40;41].

SC integrity depends on regular regulation of total lipids. Total ageing skin lipid content was reduced by 65%. Ceramide levels, specifically ceramide 1 linoleate and ceramide, are significantly reduced in older skin. Triglycerides are also reduced, such as the sterol fraction of the stratum corneum lipids. Although NMF levels in SC are higher in older skin than in younger ones (a consequence of slower epidermal turnover rates in older people), amino acid levels are lower. Fewer but much larger corneocytes, with higher intra-corneal cohesiveness [42;43].

The relationship between drinking water and sebum with the face skin wrinkles level - In the multivariate test results it was found that it was more meaningful and related to the sebum variable compared to the drinking water variable. This is supported by Popkin in 2010, that the skin contains about 30% water, which contributes to the skin's elasticity, elasticity, and durability. SC cellular structures and skin lipids can work to hold water in the skin. Water intake, especially in individuals with high initial water intake, can increase skin thickness and density. However, adequate skin hydration is not enough to prevent wrinkles or other signs of ageing, which are related to genetics and the sun and environmental damage. Which is more useful for individuals who have been consuming enough fluids from the start.

When compared with sebum, which is indeed influenced by age, sebum production has decreased by 23% in men and 32% in women every 10 years. Although sebum production decreases, sebaceous glands continue to enlarge so that the skin pores, especially the face, appear to be getting bigger too [44;45]. The integrity of SC depends on the regular regulation of total lipids. Total ageing skin lipid content was reduced by 65%. So that facial skin that contains lots of sebaceous glands produces more sebum, thus preventing the skin from becoming dry and deeper skin wrinkles. If the levels of sebaceous glands are less then the shape of the skin is more easily changed and the risk of formation of skin wrinkles is greater.

IV. Conclusion

From the results of research conducted by researchers, it can be concluded that the frequency of the level of skin wrinkles in women aged 50-60 years, most with the type of fine lines wrinkles and no congregations found in the category of the amount of drinking water consumption is less. The frequency of sebum levels based on skin type in the female congregation was the oiliest skin type which was 63.3%. There is a significant correlation between the amount of drinking water consumption and sebum levels with the level of skin wrinkles. Sebum levels are more or less decisive for facial wrinkles.

REFERENCES

1. Honari, G. (2017). Skin structure and function. In *Sensitive Skin Syndrome, Second Edition* (pp. 26-32). CRC Press.
2. Kolarsick, P. A., Kolarsick, M. A., & Goodwin, C. (2011). Anatomy and physiology of the skin. *Journal of the Dermatology Nurses' Association*, 3(4), 203-213.
3. Kapoor, S., & Saraf, S. (2010). Formulation and evaluation of moisturizer containing herbal extracts for the management of dry skin. *Pharmacognosy Journal*, 2(11), 409-417.
4. Cipriani, E., Bernardi, S., & Continenza, M. A. (2016). Wrinkles: origins and treatments. *Advances in Cosmetics and Dermatology*, 2(1), 1-7.
5. Manríquez, J. J., Cataldo, K., Vera-Kellet, C., & Harz-Fresno, I. (2014). Wrinkles. *BMJ clinical evidence*, 2014.
6. Sjerobabski-Masneć, I., & Šitum, M. (2010). Skin ageing. *Acta Clinica Croatica*, 49(4), 515-518.
7. Grover, S., & Narasimhalu, C. R. V. (2009). A clinical study of skin changes in the geriatric population.
8. Tobin, D. J. (2017). Introduction to skin ageing. *Journal of tissue viability*, 26(1), 37-46.
9. Williams, S., Krueger, N., Davids, M., Kraus, D., & Kerscher, M. (2007). Effect of fluid intake on skin physiology: distinct differences between drinking mineral water and tap water. *International Journal of cosmetic science*, 29(2), 131-138.
10. Mac-Mary, S., Creidi, P., Marsaut, D., Courderot-Masuyer, C., Cochet, V., Gharbi, T., ... & Humbert, P. (2006). Assessment of effects of an additional dietary natural mineral water uptake on skin hydration in healthy subjects by dynamic barrier function measurements and clinic scoring. *Skin Research and Technology*, 12(3), 199-205.
11. Miller, T. (2009). Clinical testing to uphold an anti-ageing claim. In *Skin Aging Handbook* (pp. 363-389). William Andrew Publishing.
12. Picardo, M., Ottaviani, M., Camera, E., & Mastrofrancesco, A. (2009). Sebaceous gland lipids. *Dermato-endocrinology*, 1(2), 68-71.
13. Hughes, M. C. B., Williams, G. M., Baker, P., & Green, A. C. (2013). Sunscreen and prevention of skin aging: a randomized trial. *Annals of internal medicine*, 158(11), 781-790.
14. Sundberg, J. P., Booth, C. J., Nanney, L. B., Fleckman, P., & King Jr, L. E. (2018). Skin and adnexa. In *Comparative Anatomy and Histology* (pp. 511-542). Academic Press.
15. McGrath, J. A., Eady, R. A. J., & Pope, F. M. (2004). Anatomy and organization of human skin. *Rook's textbook of dermatology*, 10, 9781444317633.
16. Quinn, A. G. (2004). Biology of the skin and dermatological disease. *Medicine*, 32(12), 1-3.
17. Baumann, L. S., & Baumann, L. (2009). *Cosmetic dermatology*. McGraw-Hill Professional Publishing.

18. Puizina-Ivic, N. (2008). Skin aging. *Acta Dermatovenerologica Alpina Panonica Et Adriatica*, 17(2), 47.
19. Khavkin, J., & Ellis, D. A. (2011). Ageing skin: histology, physiology, and pathology. *Facial Plastic Surgery Clinics*, 19(2), 229-234.
20. Nadeak, B., Simanjuntak, D. R., Naibaho, L., Sormin, E., Juwita, C. P., & Pardede, S. O. (2019). Analysis of Nursing Quality Services. *Indian Journal of Public Health Research & Development*, 10(6), 1380-1384.
21. Shu, Y. Y., & Maibach, H. I. (2011). Estrogen and skin. *American journal of clinical dermatology*, 12(5), 297-311.
22. Akdeniz, M., Tomova-Simitchieva, T., Dobos, G., Blume-Peytavi, U., & Kottner, J. (2018). Does dietary fluid intake affect skin hydration in healthy humans? A systematic literature review. *Skin Research and Technology*, 24(3), 459-465.
23. Palma, L., Marques, L. T., Bujan, J., & Rodrigues, L. M. (2015). Dietary water affects human skin hydration and biomechanics. *Clinical, cosmetic and investigational dermatology*, 8, 413.
24. Barco, D., & Giménez-Arnau, A. (2008). Xerosis: a dysfunction of the epidermal barrier. *Actas Dermo-Sifiliográficas (English Edition)*, 99(9), 671-682.
25. Tamatsu, Y., Tsukahara, K., Sugawara, Y., & Shimada, K. (2015). The new finding that might explain why the skin wrinkles more on various parts of the face. *Clinical Anatomy*, 28(6), 745-752..
26. Farage, M. A., Miller, K. W., Berardesca, E., & Maibach, H. I. (2010). Psychological and social implications of ageing skin: normal aging and the effects of cutaneous disease. In *Textbook of Aging Skin* (pp. 949-957). Springer Berlin Heidelberg.
27. Wójcik, A., Kubiak, M., & Rotsztein, H. (2013). Influence of azelaic and mandelic acid peels on sebum secretion in ageing women. *Advances in Dermatology and Allergology/Postępy Dermatologii I Alergologii*, 30(3), 140.
28. Shin, J. W., Lee, D. H., Choi, S. Y., Na, J. I., Park, K. C., Youn, S. W., & Huh, C. H. (2011). Objective and non-invasive evaluation of photorejuvenation effect with intense pulsed light treatment in Asian skin. *Journal of the European Academy of Dermatology and Venereology*, 25(5), 516-522.
29. Rahrovan, S., Fanian, F., Mehryan, P., Humbert, P., & Firooz, A. (2018). Male versus female skin: What dermatologists and cosmeticians should know. *International journal of women's dermatology*, 4(3), 122-130.
30. Wa, C. V., & Maibach, H. I. (2010). Mapping the human face: biophysical properties. *Skin Research and Technology*, 16(1), 38-54.
31. Lohani, A., Verma, A., Joshi, H., Yadav, N., & Karki, N. (2014). Nanotechnology-based cosmeceuticals. *ISRN Dermatology*, 2014.
32. Southall, M., Martin, K., Lukenbach, E. R., Bordoloi, B. K., Kizoulis, M., Pappas, A., & Salerno, C. S. (2012). *U.S. Patent No. 8,278,359*. Washington, DC: U.S. Patent and Trademark Office.
33. Matsui, M. S., Cruz, J. D., Tang, J., Deng, B. W., Xie, X., & Lei, G. (2017, December). Logistic regression analysis differentiates high from low computer users by facial skin conditions in a population of Chinese women. In *Applied Informatics* (Vol. 4, No. 1, p. 4). Springer Berlin Heidelberg.
34. Nadeak, B., Iriani, U. E., Naibaho, L., Sormin, E., & Juwita, C. P. (2019). Building Employees' Mental Health: The Correlation between Transactional Leadership and Training

- Program with Employees' Work Motivation at XWJ Factory. *Indian Journal of Public Health Research & Development*, 10(6), 1373-1379.
35. Fąk, M., Rotsztejn, H., & Erkiert-Polguj, A. (2018). The early effect of microdermabrasion on hydration and sebum level. *Skin Research and Technology*, 24(4), 650-655.
 36. Pontius, A. T., & Smith, P. W. (2011). An antiaging and regenerative medicine approach to optimal skin health. *Facial Plastic Surgery*, 27(01), 029-034.
 37. Boireau-Adamezyk, E., Baillet-Guffroy, A., & Stamatas, G. N. (2014). Age-dependent changes in stratum corneum barrier function. *Skin Research and Technology*, 20(4), 409-415.
 38. Kim, T., Ha, J., Lee, J. S., Oh, Y., & Cho, Y. J. (2016). Discovering Relationships between Skin Type and Life Style Using Data Mining Techniques: A Case Study of Korea. *Industrial Engineering & Management Systems*, 15(1), 110-121.
 39. Kim, E. J., Han, J. Y., Lee, H. K., He, Q. Q., Cho, J. C., Wei, L., ... & Gao, X. (2014). Effect of the regional environment on the skin properties and the early wrinkles in young Chinese women. *Skin Research and Technology*, 20(4), 498-502.
 40. Nadeak, B., & Naibaho, L. (2019, November). Investigating the effect of learning multimedia and thinking style preference on learning achievement on anatomy at Universitas Kristen Indonesia. In *Journal of Physics: Conference Series* (Vol. 1387, No. 1, p. 012116). IOP Publishing.
 41. Wilantho, A., Deekaew, P., Srisuttiyakorn, C., Tongsimma, S., & Somboonna, N. (2017). Diversity of bacterial communities on the facial skin of different age-group Thai males. *PeerJ*, 5, e4084.
 42. Rolfe, H. M. (2014). A review of nicotinamide: treatment of skin diseases and potential side effects. *Journal of cosmetic dermatology*, 13(4), 324-328.
 43. Min, P., Xi, W., Grasseti, L., Trislina Perdanasari, A., Torresetti, M., Feng, S., ... & Zhang, Y. X. (2015). Sebum production alteration after botulinum toxin types A injections for the treatment of forehead rhytides: a prospective randomized double-blind dose-comparative clinical investigation. *Aesthetic surgery journal*, 35(5), 600-610.
 44. Nadeak, B., Naibaho, L., Sormin, E., & Juwita, C. P. (2019). Healthy Work Culture Stimulate Performance. *Indian Journal of Public Health Research & Development*, 10(6), 1385-1389.
 45. Gillbro, J. M., & Olsson, M. J. (2011). The melanogenesis and mechanisms of skin-lightening agents—existing and new approaches. *International Journal of cosmetic science*, 33(3), 210-221.

The Relationship between Drinking Water Consumption and Sebum Level with Face Skin Wrinkle of Woman at Gereja Batak Karo Protestant

by Ago Harlim

Submission date: 27-May-2020 12:21PM (UTC+0700)

Submission ID: 1332614537

File name: m___The_Relationship_between_Drinking_Water_Consumption___3.docx (188.41K)

Word count: 4273

Character count: 22581

The Relationship between Drinking Water Consumption and Sebum Level with Face Skin Wrinkle of Woman at *Gereja Batak Karo Protestant*

Ago Harlim, Agita Gloria

Medical Faculty, *Universitas Kristen Indonesia*, Jakarta

Corresponding Author: agoharlim@yahoo.com

Abstract

Face skin wrinkles are folds or creases that form under the skin layer. The process of forming skin wrinkles is not known, but there are intrinsic and extrinsic factors that can affect the formation of skin wrinkles. This study aims to determine whether there is any correlation between the amount of drinking water consumption and sebum levels with the level of facial skin wrinkles. This study used observational analytic with a cross-sectional study design method, with 66 respondents as female congregants from the *Gereja Batak Karo Protestan*, age between 50-60 years. Before the skin examination, the respondents measured the water consumption in one day with a 500 mL drinking bottle for 3 consecutive days than record the results. In this study, Dermoprime Viso was used as a skin analyzer to determine the level of sebum and the level of facial skin wrinkles of the respondents. Besides, Spearman and Kruskal Wallis were used for statistical assessment purposes. The study results found that there are significant correlations between the amount of drinking water consumption and sebum levels with the level of skin wrinkles.

Keywords: Face Skin Wrinkles, Sebum, Water

I. INTRODUCTION

The skin is the largest organ in the human body, which is about 15% of an adult's body weight. The skin functions as a body protector from environmental exposure namely ultraviolet (UV), chemical and physical trauma, and microorganisms. Besides, the skin also functions to prevent dehydration, regulate body temperature, and can regenerate itself [1;2;3]. The skin is the outermost layer of the body and is constantly exposed to stimuli from the environment [4]. As we get older, the skin will share the ageing process which causes the skin to become thinner, dry, wrinkled, and there is uneven pigmentation [5;6].

Wrinkles are wrinkles or curves that form on the bottom surface of the skin. Towards the age of the third decade, the skin begins to experience structural changes and fine wrinkles begin to appear. Skin wrinkles are measured in depth and width, wrinkles less than 1 mm are classified as fine wrinkles. And wrinkles more than 1 mm are classified into deep wrinkles. Wrinkles on the facial skin, arms and hands are easily observed, so research is often done on these parts [7;8]. According to a 2009 Gover study found that most in diseases related to skin aged 60-70 years are skin wrinkles that are 95.5%. The most wrinkled locations are the areas of the skin that are often exposed to sunlight, namely the face, neck, lower limbs and back of the hands [9;10].

The process of the formation of skin wrinkles is not known with certainty, because many factors affect. Based on research, it is known that skin wrinkles are influenced by two interrelated factors namely internal factors and external factors [11;12]. The shape and function

of the skin are maintained by the balance of water content in the stratum corneum (SC) and skin surface lipids (SSL) in the epidermis [3;13].

In SC, if dehydration can cause fine wrinkles on the skin, but it happens reversibly and can be treated with fluid rehydration. In general, many statements that the consumption of adequate and regular drinking water will make the skin moist and prevent wrinkles. A research was conducted to a prospective study of a group of healthy people who consumed 2.25 L of mineral water or tap water for 4 weeks. From the results of his research stated that an increase in water content in the epidermis, the skin looks smoother and increased skin density [9;14;15]. The consumption of adequate drinking water can increase levels of humidity in SC [10;16]. As for SSL, it is formed from sebum produced by sebaceous glands [17;18]. Radiation from the sun can accelerate the process of formation of skin wrinkles. One function of sebum is as photoprotection from UV radiation, to reduce direct exposure to sunlight [19; 20].

Based on this, the researcher is interested in finding out whether there is a relationship between the amount of drinking water consumption and sebum levels to the level of skin wrinkles in the female congregation of the *Gereja Batak Karo Protestan* (GBKP).

II. RESEARCH METHOD

The design of this study was an observational analytical study using a cross-sectional study design, with the scope of Skin Health and Gender Sciences. The scope of the research location is the *Pondok Gede Ruggun GBKP* congregation. When the research was conducted in November - December 2019. The population in this study was the *GBKP* female congregation and the sample used in this study was a portion of the *GBKP* female congregation aged 50-60 years. The sampling of this research used total sampling technique. The research tools used in this study were questionnaires, 500 mL drinking bottles, and skin examination tools using the Skin Diagnostic System: Dermaprime viso. Dermoprime Viso is a measuring tool that automatically makes a diagnosis for the skin. This tool is equipped with a camera's optical lens, LED lights, skin moisture sensor, algorithm calculation, and Artificial Intelligence (AI) system. The Dermoprime Viso device can measure moisture, pores, skin wrinkles, skin pigmentation, keratin and skin types (sebum). The amount of drinking water consumption in 1 day is as follows, Less (<2 L), Enough (2-2.5L) and Lots (> 2.5L).

III. RESULT AND DISCUSSION

The results of research data conducted in November - December 2019, will be analyzed using the SPSS program or software version 16.0, by testing the results of the univariate analysis using descriptive and bivariate using nonparametric correlation tests with the Spearman and Kruskal Wallis methods. The univariate analysis discusses the description and analysis of the description of the variables in the study. The results of the study obtained primary data, intending to determine the characteristics of the respondents in this study with the following results.

Table 1. Age Frequency of Respondents

Age (year)	Frequency	%
50	11	16.7
51	9	13.6
52	5	7.6
53	7	10.6
54	5	7.6
55	3	4.5
56	8	12.1
57	6	9.1
58	2	3.0
59	4	6.1
60	6	9.1
Total	66	100.0

Based on table 1, the description of the respondent's age is known, obtained all ages according to the inclusion criteria, namely female respondents aged 50-60 years. Of the 66 respondents the most number was 50 years old (16.7%) and the lowest number was at the age of 58 years (3%).

Table 2. Frequency of Drinking Water Consumption

Water Consumption	Frequency	%
Lack	0	0.0
Enough	26	39.4
High	40	60.6
Total	66	100.0

Based on table 2, obtained drinking water consumption data, that there are no respondents whose drinking water consumption is lacking, as many as 26 respondents (39.4%) consume enough drinking water, and high water consumption in the many categories is 40 respondents (60.6%).

Table 3. Frequency of Sebum Content by Skin Type

Skin Types	Frequency	%
Dry	14	21.2
Oily	42	63.3
Combination	10	15.2
Total	66	100.0

Based on table 3, 14 respondents (21.2%) had dry skin types, 42 respondents (63.3%) had oily skin types, and 10 respondents (15.2%) had combination skin types. From the data table above, it shows that the majority of respondents have oily skin types.

Table 4. Frequency of Wrinkles

Wrinkle Level	Frequency	%
Good	3	4.5
Fine Lines	35	53.0
Expression Lines	22	33.3
Deep Wrinkle	6	9.1
Total	66	100.0

Based on table 4, it was found that 3 respondents (4.5%) had wrinkle levels Good, 35 respondents (53.0%) had wrinkle levels of fine lines, 22 respondents had wrinkle levels Expression Lines, and 6 respondents had Deep Wrinkle levels. From the data table above shows that the majority of respondents have fine lines wrinkles. The bivariate analysis aims to determine the relationship between the independent variables (drinking water and sebum) with the dependent variable (skin wrinkles). To test the relationship between the two variables using a non-parametric test with the Spearman and Kruskal Wallis methods.

17

The Relationship between Drinking Water Consumption and the Skin Wrinkles Levels

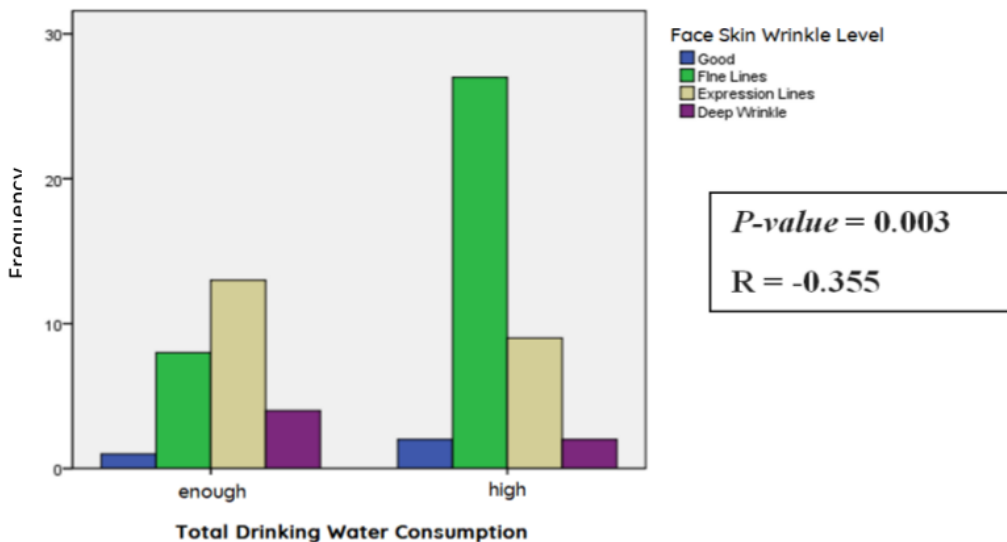


Figure 1. Drinking-Water Consumption and Skin Wrinkles Level

Based on figure 1, it is known that respondents who consume more drinking water tend to have better levels of wrinkles. The scale used for the variable amount of drinking water consumption and the level of skin wrinkles is the ordinal-ordinal scale because it was analyzed by the Kolmogorov-Smirnov normality test method first. Normality test results obtained a P-value of 0,000 in both drinking water data because the P-value <0.05 so that it can be concluded that the amount of drinking water data is not normally distributed. Then, it will proceed with the Spearman analysis test.

The relationship between Sebum Level based on Skin Type with the Face Skin Wrinkle Level

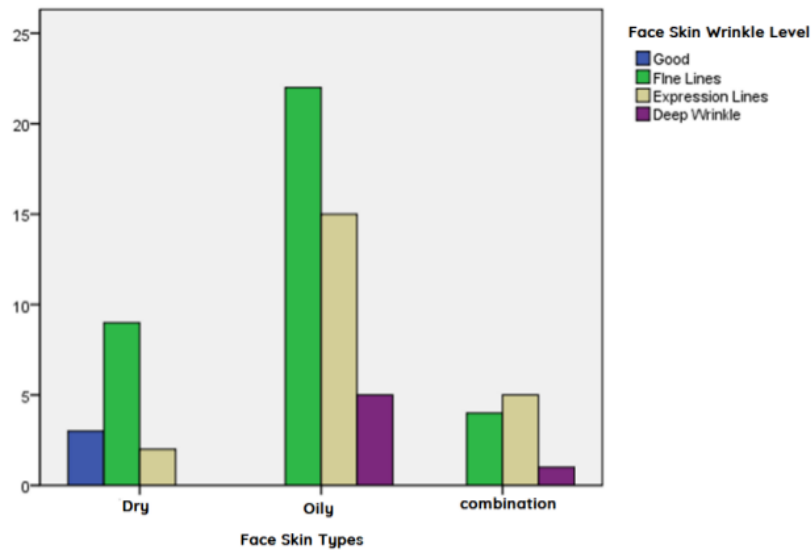


Figure 2. Sebum Frequency Based on Skin Type with the Face Skin Wrinkle Level

Based on figure 2, it is known that only respondents with dry skin type have good levels of skin wrinkles, as well as the deep wrinkle category only dry skin types that do not exist. When compared with oily and combination skin types. The scale used for variable skin type and level of skin wrinkles is a nominal ordinal scale because it was analyzed by the Kolmogorov-Smirnov normality test method first. Based on the results of the normality test, a P-value of 0,000 was obtained for respondents with dry and oily skin types and a P-value of 0.035 for respondents for combination skin types. Because the P-value <0.05, it can be concluded that the three data are not normally distributed. Then it will be continued with the *Kruskal Wallis* analysis test.

Table 5. The Relationship of Sebum Level and Face Skin Type with Face Skin Wrinkles Level

Test	P-value	Result
The relationship of sebum level and face skin type with face skin wrinkles level	0.010	Significant

Kruskal Wallis Analysis Test, significant on $\leq p 0.05$

From the results of the table above, we got the P-value of 0.010. Because the P-value <0.05, it can be concluded that there is a significant relationship between sebum levels based on skin type and the level of skin wrinkles. From the bivariate analysis selection results, the two independent variables P-value results <0.05, then can be entered into multivariate analysis.

Table 6. The Relationship between Drinking Water and Sebum with Face Skin Wrinkles Level

Variable	P-value
Drinking-Water Consumption	0.025
Sebum	0.019

Logistic regression test, significant at $\leq p 0.05$

The variable is said to be the most significant if the number of P-values is the smallest, so in this study, the most influential variable on the level of skin wrinkles is sebum because the P-value is 0.019.

In this study, univariate results did not get the amount of drinking water consumption that was lacking. Because the respondents that researchers get come from church congregations whose level of knowledge about drinking water consumption can be said to be good, and can also be connected with the level of education of respondents, namely the average high school education and S1 factors that help in terms of the level of consumption knowledge in addition to the level of education are employment status, family income, maternal nutrition knowledge, and health education. In this case, health education is intended to raise awareness, provide or increase community knowledge about the maintenance and improvement of health both himself, his family and the surrounding community [21;22].

The highest frequency of sebum content based on skin type is oily skin type. And based on the age of the respondents, the most were 50 years of age. These are interconnected because sebum production is related to age. Along with the increase, the production of sebum in the skin will decrease. Sebum production will decrease by 32% every 10 years in women, starting from the age of 50 years [23; 24;25]. Therefore, the results of the frequency of the level of wrinkles of respondents obtained the highest level of fine lines wrinkles. This can be attributed to the majority of respondents' skin types are oily skin types. Because, more levels of sebaceous glands can prevent the formation of dry skin and wrinkled skin [26;27].

The relationship between drinking water consumption with the face skin wrinkles level - In this study there is a relationship between the amount of drinking water consumption with the level of skin wrinkles. This result can also be linearly related to the research, which compares the skin condition of the respondent with the amount of drinking water consumed daily. In the results of the study, it was found that the level of hydration and biomechanical conditions of the skin condition of people who consume more drinking water is better when compared to people who consume less drinking water [23]. The skin condition will change to become smoother when skin moisture is maintained, this happens when there is an increase in drinking water consumption. So that through this research it can be seen, besides consuming enough drinking water can make the skin condition improve and smoother, consuming enough drinking water can also have a lower level of skin wrinkles [28; 29].

The manifestation of the ageing process in the form of wrinkled skin and lines, and the emergence of spots (patches on the skin). This is due to decreased production of type I collagen and increased extracellular matrix collagen fragmentation. Besides, in the elderly population, dry skin (xerosis cutis) is associated with loss of adipose tissue and a decrease in body fluids. Water content in ageing skin, especially the stratum corneum, is less than in younger skin [30;31;32]. Age-related changes in the composition of amino acids, besides, reduce the amount of skin NMF, thereby reducing the binding capacity of skin water. SC water levels, in particular,

progressively decrease with age, eventually dropping below the level needed for effective desquamation. Decreased desquamation process causes corneocytes to accumulate and adhere to the surface of the skin, resulting in rough, scaly, and scaly skin that accompanies xerosis in ageing skin [33;34;35].

The relationship between Sebum and face skin type with the face skin wrinkles level - The results of the study between sebum levels and skin types with the level of skin wrinkles are directly proportional. The association between sebaceous glands and the depth of wrinkles. Shallow wrinkles on the skin that contain more sebaceous glands, it can be one of the factors that prevent dry skin and prevent the formation of deep skin wrinkles [36;37].

In addition to the face, manifestations of skin ageing also occur in all skin in other areas. Some clinical manifestations that often interfere with skin ageing are pruritus senilis, actinic keratosis, seborrheic keratosis, and lentigo solaris. Senile pruritus or itching complaints in old age are mainly caused by dry skin syndrome or often called xerosis cutis [38;39]. The incidence rate in the elderly is reported to be 30-75%, due to the influence of skin ageing which causes a decrease in the ability to maintain skin moisture, increase transepidermal water loss (TEWL), decrease sweat and sebum production, and decrease the factors that maintain skin moisture. Some extrinsic factors can also trigger, including low air humidity, excessive bathing habits, the use of irritative soaps, the use of clothes that are irritative, and the use of alcohol and acetone on the skin. Clinical features include the appearance of dull and rough skin that is sometimes accompanied by squama, and complaints of itching [40;41].

SC integrity depends on regular regulation of total lipids. Total ageing skin lipid content was reduced by 65%. Ceramide levels, specifically ceramide 1 linoleate and ceramide, are significantly reduced in older skin. Triglycerides are also reduced, such as the sterol fraction of the stratum corneum lipids. Although NMF levels in SC are higher in older skin than in younger ones (a consequence of slower epidermal turnover rates in older people), amino acid levels are lower. Fewer but much larger corneocytes, with higher intra-corneal cohesiveness [42;43].

The relationship between drinking water and sebum with the face skin wrinkles level - In the multivariate test results it was found that it was more meaningful and related to the sebum variable compared to the drinking water variable. This is supported by Popkin in 2010, that the skin contains about 30% water, which contributes to the skin's elasticity, elasticity, and durability. SC cellular structures and skin lipids can work to hold water in the skin. Water intake, especially individuals with high initial water intake, can increase skin thickness and density. However, adequate skin hydration is not enough to prevent wrinkles or other signs of ageing, which are related to genetics and the sun and environmental damage. Which is more useful for individuals who have been consuming enough fluids from the start.

When compared with sebum, which is indeed influenced by age, sebum production has decreased by 23% in men and 32% in women every 10 years. Although sebum production decreases, sebaceous glands continue to enlarge so that the skin pores, especially the face, appear to be getting bigger too [44;45]. The integrity of SC depends on the regular regulation of total lipids. Total ageing skin lipid content was reduced by 65%. So that facial skin that contains lots of sebaceous glands produces more sebum, thus preventing the skin from becoming dry and deeper skin wrinkles. If the levels of sebaceous glands are less then the shape of the skin is more easily changed and the risk of formation of skin wrinkles is greater.

IV. Conclusion

From the results of research conducted by researchers, it can be concluded that the frequency of the level of skin wrinkles in women aged 50-60 years, most with the type of fine lines wrinkles and no congregations found in the category of the amount of drinking water consumption is less. The frequency of sebum levels based on skin type in the female congregation was the oiliest skin type which was 63.3%. There is a significant correlation between the amount of drinking water consumption and sebum levels with the level of skin wrinkles. Sebum levels are more or less decisive for facial wrinkles.

REFERENCES

1. Honari, G. (2017). Skin structure and function. In *Sensitive Skin Syndrome, Second Edition* (pp. 26-32). CRC Press.
2. Kolarsick, P. A., Kolarsick, M. A., & Goodwin, C. (2011). Anatomy and physiology of the skin. *Journal of the Dermatology Nurses' Association*, 3(4), 203-213.
3. Kapoor, S., & Saraf, S. (2010). Formulation and evaluation of moisturizer containing herbal extracts for the management of dry skin. *Pharmacognosy Journal*, 2(11), 409-417.
4. Cipriani, E., Bernardi, S., & Continenza, M. A. (2016). Wrinkles: origins and treatments. *Advances in Cosmetics and Dermatology*, 2(1), 1-7.
5. Manríquez, J. J., Cataldo, K., Vera-Kellet, C., & Harz-Fresno, I. (2014). Wrinkles. *BMJ clinical evidence*, 2014.
6. Sjerobabski-Masneć, I., & Šitum, M. (2010). Skin ageing. *Acta Clinica Croatica*, 49(4), 515-518.
7. Grover, S., & Narasimhalu, C. R. V. (2009). A clinical study of skin changes in the geriatric population.
8. Tobin, D. J. (2017). Introduction to skin ageing. *Journal of tissue viability*, 26(1), 37-46.
9. Williams, S., Krueger, N., Davids, M., Kraus, D., & Kerscher, M. (2007). Effect of fluid intake on skin physiology: distinct differences between drinking mineral water and tap water. *International Journal of cosmetic science*, 29(2), 131-138.
10. Mac-Mary, S., Creidi, P., Marsaut, D., Courderot-Masuyer, C., Cochet, V., Gharbi, T., ... & Humbert, P. (2006). Assessment of effects of an additional dietary natural mineral water uptake on skin hydration in healthy subjects by dynamic barrier function measurements and clinic scoring. *Skin Research and Technology*, 12(3), 199-205.
11. Miller, T. (2009). Clinical testing to uphold an anti-ageing claim. In *Skin Aging Handbook* (pp. 363-389). William Andrew Publishing.
12. Picardo, M., Ottaviani, M., Camera, E., & Mastrofrancesco, A. (2009). Sebaceous gland lipids. *Dermato-endocrinology*, 1(2), 68-71.
13. Hughes, M. C. B., Williams, G. M., Baker, P., & Green, A. C. (2013). Sunscreen and prevention of skin aging: a randomized trial. *Annals of internal medicine*, 158(11), 781-790.
14. Sundberg, J. P., Booth, C. J., Nanney, L. B., Fleckman, P., & King Jr, L. E. (2018). Skin and adnexa. In *Comparative Anatomy and Histology* (pp. 511-542). Academic Press.
15. McGrath, J. A., Eady, R. A. J., & Pope, F. M. (2004). Anatomy and organization of human skin. *Rook's textbook of dermatology*, 10, 9781444317633.
16. Quinn, A. G. (2004). Biology of the skin and dermatological disease. *Medicine*, 32(12), 1-3.
17. Baumann, L. S., & Baumann, L. (2009). *Cosmetic dermatology*. McGraw-Hill Professional Publishing.

18. Puizina-Ivic, N. (2008). Skin aging. *Acta Dermatovenerologica Alpina Panonica Et Adriatica*, 17(2), 47.
19. Khavkin, J., & Ellis, D. A. (2011). Ageing skin: histology, physiology, and pathology. *Facial Plastic Surgery Clinics*, 19(2), 229-234.
20. Nadeak, B., Simanjuntak, D. R., Naibaho, L., Sormin, E., Juwita, C. P., & Pardede, S. O. (2019). Analysis of Nursing Quality Services. *Indian Journal of Public Health Research & Development*, 10(6), 1380-1384.
21. Shu, Y. Y., & Maibach, H. I. (2011). Estrogen and skin. *American journal of clinical dermatology*, 12(5), 297-311.
22. Akdeniz, M., Tomova-Simitchieva, T., Dobos, G., Blume-Peytavi, U., & Kottner, J. (2018). Does dietary fluid intake affect skin hydration in healthy humans? A systematic literature review. *Skin Research and Technology*, 24(3), 459-465.
23. Palma, L., Marques, L. T., Bujan, J., & Rodrigues, L. M. (2015). Dietary water affects human skin hydration and biomechanics. *Clinical, cosmetic and investigational dermatology*, 8, 413.
24. Barco, D., & Giménez-Arnau, A. (2008). Xerosis: a dysfunction of the epidermal barrier. *Actas Dermo-Sifiliográficas (English Edition)*, 99(9), 671-682.
25. Tamatsu, Y., Tsukahara, K., Sugawara, Y., & Shimada, K. (2015). The new finding that might explain why the skin wrinkles more on various parts of the face. *Clinical Anatomy*, 28(6), 745-752..
26. Farage, M. A., Miller, K. W., Berardesca, E., & Maibach, H. I. (2010). Psychological and social implications of ageing skin: normal aging and the effects of cutaneous disease. In *Textbook of Aging Skin* (pp. 949-957). Springer Berlin Heidelberg.
27. Wójcik, A., Kubiak, M., & Rotsztein, H. (2013). Influence of azelaic and mandelic acid peels on sebum secretion in ageing women. *Advances in Dermatology and Allergology/Postępy Dermatologii I Alergologii*, 30(3), 140.
28. Shin, J. W., Lee, D. H., Choi, S. Y., Na, J. I., Park, K. C., Youn, S. W., & Huh, C. H. (2011). Objective and non-invasive evaluation of photorejuvenation effect with intense pulsed light treatment in Asian skin. *Journal of the European Academy of Dermatology and Venereology*, 25(5), 516-522.
29. Rahrovan, S., Fanian, F., Mehryan, P., Humbert, P., & Firooz, A. (2018). Male versus female skin: What dermatologists and cosmeticians should know. *International journal of women's dermatology*, 4(3), 122-130.
30. Wa, C. V., & Maibach, H. I. (2010). Mapping the human face: biophysical properties. *Skin Research and Technology*, 16(1), 38-54.
31. Lohani, A., Verma, A., Joshi, H., Yadav, N., & Karki, N. (2014). Nanotechnology-based cosmeceuticals. *ISRN Dermatology*, 2014.
32. Southall, M., Martin, K., Lukenbach, E. R., Bordoloi, B. K., Kizoulis, M., Pappas, A., & Salerno, C. S. (2012). *U.S. Patent No. 8,278,359*. Washington, DC: U.S. Patent and Trademark Office.
33. Matsui, M. S., Cruz, J. D., Tang, J., Deng, B. W., Xie, X., & Lei, G. (2017, December). Logistic regression analysis differentiates high from low computer users by facial skin conditions in a population of Chinese women. In *Applied Informatics* (Vol. 4, No. 1, p. 4). Springer Berlin Heidelberg.
34. Nadeak, B., Iriani, U. E., Naibaho, L., Sormin, E., & Juwita, C. P. (2019). Building Employees' Mental Health: The Correlation between Transactional Leadership and Training

- Program with Employees' Work Motivation at XWJ Factory. *Indian Journal of Public Health Research & Development*, 10(6), 1373-1379.
35. Fąk, M., Rotsztejn, H., & Erkiert-Polguj, A. (2018). The early effect of microdermabrasion on hydration and sebum level. *Skin Research and Technology*, 24(4), 650-655.
 36. Pontius, A. T., & Smith, P. W. (2011). An antiaging and regenerative medicine approach to optimal skin health. *Facial Plastic Surgery*, 27(01), 029-034.
 37. Boireau-Adamezyk, E., Baillet-Guffroy, A., & Stamatias, G. N. (2014). Age-dependent changes in stratum corneum barrier function. *Skin Research and Technology*, 20(4), 409-415.
 38. Kim, T., Ha, J., Lee, J. S., Oh, Y., & Cho, Y. J. (2016). Discovering Relationships between Skin Type and Life Style Using Data Mining Techniques: A Case Study of Korea. *Industrial Engineering & Management Systems*, 15(1), 110-121.
 39. Kim, E. J., Han, J. Y., Lee, H. K., He, Q. Q., Cho, J. C., Wei, L., ... & Gao, X. (2014). Effect of the regional environment on the skin properties and the early wrinkles in young Chinese women. *Skin Research and Technology*, 20(4), 498-502.
 40. Nadeak, B., & Naibaho, L. (2019, November). Investigating the effect of learning multimedia and thinking style preference on learning achievement on anatomy at Universitas Kristen Indonesia. In *Journal of Physics: Conference Series* (Vol. 1387, No. 1, p. 012116). IOP Publishing.
 41. Wilantho, A., Deekaew, P., Srisuttiyakorn, C., Tongsimma, S., & Somboonna, N. (2017). Diversity of bacterial communities on the facial skin of different age-group Thai males. *PeerJ*, 5, e4084.
 42. Rolfe, H. M. (2014). A review of nicotinamide: treatment of skin diseases and potential side effects. *Journal of cosmetic dermatology*, 13(4), 324-328.
 43. Min, P., Xi, W., Grasseti, L., Trislana Perdanasari, A., Torresetti, M., Feng, S., ... & Zhang, Y. X. (2015). Sebum production alteration after botulinum toxin types A injections for the treatment of forehead rhytides: a prospective randomized double-blind dose-comparative clinical investigation. *Aesthetic surgery journal*, 35(5), 600-610.
 44. Nadeak, B., Naibaho, L., Sormin, E., & Juwita, C. P. (2019). Healthy Work Culture Stimulate Performance. *Indian Journal of Public Health Research & Development*, 10(6), 1385-1389.
 45. Gillbro, J. M., & Olsson, M. J. (2011). The melanogenesis and mechanisms of skin-lightening agents—existing and new approaches. *International Journal of cosmetic science*, 33(3), 210-221.

The Relationship between Drinking Water Consumption and Sebum Level with Face Skin Wrinkle of Woman at Gereja Batak Karo Protestant

ORIGINALITY REPORT

12%

SIMILARITY INDEX

5%

INTERNET SOURCES

9%

PUBLICATIONS

4%

STUDENT PAPERS

PRIMARY SOURCES

1	"Textbook of Aging Skin", Springer Nature, 2017 Publication	3%
2	Miranda A. Farage. "Degenerative Changes in Aging Skin", Textbook of Aging Skin, 2010 Publication	2%
3	academic.oup.com Internet Source	2%
4	H Setyawan, Q C Pratiwi, I Sjarifah, T B Atmojo, Khotijah. "Environmental heat stress enhances crystallization in urine", IOP Conference Series: Earth and Environmental Science, 2018 Publication	1%
5	link.springer.com Internet Source	1%
6	Submitted to Waiariki Institute of Technology Student Paper	<1%
7	onlinelibrary.wiley.com Internet Source	

<1%

8

cesmaa.org

Internet Source

<1%

9

repository.unair.ac.id

Internet Source

<1%

10

lesliebaumannmd.com

Internet Source

<1%

11

www.hindawi.com

Internet Source

<1%

12

Zheng-Mei Xiong, Mike O'Donovan, Linlin Sun, Ji Young Choi, Margaret Ren, Kan Cao. "Anti-Aging Potentials of Methylene Blue for Human Skin Longevity", Scientific Reports, 2017

Publication

<1%

13

Submitted to University of Birmingham

Student Paper

<1%

14

worldwidescience.org

Internet Source

<1%

15

Submitted to University of the Arts, London

Student Paper

<1%

16

Submitted to Baylor University

Student Paper

<1%

17

King Kuok Kuok, Po Chan Chiu. "Indigenous

drinking-water consumption pattern of residents in Kuching city: results of a pilot study", Journal of Water, Sanitation and Hygiene for Development, 2018

Publication

<1%

18

Sri Malem Indirawati, Setiaty Pandia, Herman Mawengkang, Wirsal Hasan. "Enviromental Health Risks on Community in Coastal Area As a Results The Presence of Pb in Sea Water and Drinking Water.", IOP Conference Series: Materials Science and Engineering, 2018

Publication

<1%

19

"Treatment of Dry Skin Syndrome", Springer Science and Business Media LLC, 2012

Publication

<1%

Exclude quotes On

Exclude matches Off

Exclude bibliography On