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DIFFERENT EFFECTS OF IONTOPORESIS AND MASSAGE WITH THE ADDITION OF VITAMIN C SERUM ON ELASTICITY WOMEN'S FACE SKIN

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ABSTRACT : The skin is one part of the body that must be maintained, especially facial skin. Skin that experiences continuous exposure either directly or indirectly can cause damage and premature aging. To prevent this damage, the skin has defense mechanisms. Therefore, this study was conducted to determine the difference in the effectiveness of Iontophoresis with vitamin C serum and massage with vitamin C serum on the elasticity of women's facial skin. Iontophoresis with vitamin C serum can penetrate the skin layer of the corneum due to the electromigration process. Propylene glycol in vitamin C can affect the stratum corneum to intercalate lipids so as to make the skin structure more and the coefficient. *Massage* can help accelerate the absorption of vitamin C into the skin so that it relaxes facial skin, improves skin health and restores facial elasticity. **Background**: Skin aging is the most worrisome problem in women, looks like wrinkles, sagging, uneven skin tone, dull or dry skin and the most important part of the skin is facial skin. Aging facial skin will be difficult to restore and can reduce a person's appearance. **Methods**: The type of research used *quasi experimental 1 two group pre and post test design* carried out in September – October 2021 in 2021 on resident mothers in Tohudan Colomadu Village. The number of subjects in each group was 30 people who were divided into 2 groups, namely: (1) Iontophoresis with Vitamin C Serum, (2) *massage* with Vitamin C Serum. **Results**: Test the difference in elasticity values of Group I and Group 2 with the Independent Samples Test, the result is p value = 0.015, which means there is a significant difference in the administration of Iontophoresis and Massage with the addition of Vitamin C Serum. **Conclusion**: Giving Iontophoresis with Vitamin C Serum is more effective than massage with the addition of Vitamin C Serum on facial skin elasticity in women.

Keywords : Women, Iontophoresis, Massage, Vitamin C Serum, Facial skin elasticity

INTRODUCTION

Skin aging is one of the most worrying problems for a woman, especially facial skin causes of skin aging can be categorized into intrinsic factors chronological and extrinsic (Nabila, Damayanti, Handayani, & Setyaningrum, 2025). Aging factors are extrinsically related to environmental exposure, health, and lifestyle related to individual habits, such as sun exposure, tobacco use, diet, and exercise. Changes in the skin is one of the important signs of aging (Noh et al., 2016). Skin aging is a natural process, and has many causes. Aging of the skin can be the result of a damaging process skin structure and decreased normal skin function. 97% of skin aging factors are extrinsic, where the remaining 3% from intrinsic factor. Extrinsic factors are closely related to lifestyle such as smoking, excessive

alcohol, and nutrition, can also contribute to premature skin aging³, therefore it is necessary to further investigate the effect of lifestyle on skin aging (Nabila et al., 2021). The appearance of the skin, its smoothness, elasticity, color and brightness gives an idea of a person's age. The appearance of facial skin is not only a reflection of skin aging, but also reflects changes due to the effects of extrinsic aging that can make a person look more beautiful older than his age (Ganceviciene, Liakou, Theodoridis, Makrantonaki, Zouboulis, 2012). Skin that is exposed to sunlight undergoes changes that result in inflammation, photoaging, and various skin disorders. photoaging of skin with wrinkling, loss of elasticity, increased skin fragility, and slower wound healing (Haerani, Chaerunisa, Yohana, & Subarnas, 2018). Changes in the dermis of the skin, there is a decrease in sebum and sweat production so that the acid mantle formed is reduced, resulting in increased water evaporation. In addition, there is a reduction in the number and size of collagen and elastin fibers so that the elasticity and elasticity of the skin is reduced. Developments that occur in the epidermal and dermal layers are mainly related to the degradation of the extracellular matrix (Limtrakul, Yodkeeree, Thippraphan, Punfa, & Srisomboon, 2016). The molecular and cellular processes in skin aging are similar to those that occur in most internal organs (Beri, 2016). Various medical therapies and topical cosmetics are used to treat aging. Recent studies have begun to test the potential of different interventions (Durai, Thappa, Kumari, & Malathi, 2012).

Iontophoresis with vitamin C serum can penetrate the skin layer of the corneum due to the electromigration process. Propylene glycol in vitamin C can affect the stratum corneum to intercalate lipids so as to make the structure more dense and the membrane permeability coefficient. In the Iontophoresis study with Vitamin C Serum conducted by the Faculty of Pharmacy, Padjajaran University, it showed an increase in the penetration of vitamin C by 11.76% into the stratum corneum and increased facial skin turgor. (Wathoni & Panji Luhur, 2012).

Massage or massage on the face is also an important role in maintaining the health of facial skin. Facial movements that we do everyday, such as chewing, frowning or smiling, actually trains the facial muscles. Facial muscles also need treatment in order to relax again. Massage on the face can increase blood circulation and increase metabolic processes (Alakram & Puckree, 2011). Massage can help accelerate the absorption of vitamin C into the skin so that it relaxes facial skin, improves skin health and restores facial elasticity.

Previous studies only looked at the effect of each intervention on facial skin elasticity, while this study compares the two interventions to find out which one is more effective in increasing facial skin elasticity.

MATERIALS AND METHODS

The type of research used in this study is a quasi-experimental that is by using two groups pre and post test, in this study there are two groups. In this study, the research subjects were given treatment with a frequency of 2 times a week for 2 weeks. The research was conducted in September – October 2021. The sample in this study PKK women in Tohudan, Colomadu Village, Karanganyar who met the criteria were 30 people.

The sampling technique used is the *purposive method sampling*. the number of samples taken based on the criteria determined by the researcher. Inclusion criteria included: (1) women aged 30-45 years (2) had no allergy to Vitamin C serum, (3) willing to participate in the research program. Exclusion criteria: (1) had skin diseases such as dermatitis, extensive wounds or systemic disease, (2) research subjects were unable to participate in the research program 3 times in a row.

In this study there are two variables, the independent variables in this study were iontophoresis and massage *with* Serum C. Iontophoresis with serum vitamin C is a low-intensity galvanic current supplemented with serum vitamin C for 5 minutes. Massage with serum C is *Massage* which is applied for 10 minutes on both sides of the face and neck, beginning with the administration of vitamin C serum . Beginning with a *stroking movement* for 30 seconds , followed by *efflurage*, *finger kneading* and *tapotement* movements, each movement carried out for 2 minutes. then closed with an *eufflurage movement* for 30 seconds . The dependent variable is facial elasticity , The elasticity parameter with the sensor from the measured skin analyzer will appear on the skin analyzer screen in the form of a scale, namely a numerical scale .

Initial data collection includes pre-test when the subject is first collected and given an explanation. The treatment in both groups was carried out after the initial data was collected and given treatment in group one in the form of iontophoresis with Serum Vitamin C, and group two *massage* with Vitamin C Serum. Post test data was collected one week after the last treatment from each group.

The data that was recapitulated for the results of measuring the skin elasticity value either before or after treatment was then carried out statistical analysis tests with data normality tests to determine whether the data were normally distributed or not. Normality test using *Shapiro-Wilk* . Test the difference in elasticity values between groups one and two using the *Independent Samples Test* .

The patient had signed an informed consent to conduct the study. Ethical permission was obtained from the Health Research Ethics Commission of Muhammadiyah University of Surakarta with the number: 3745/B.1/KEPK-FKUMS/X/2021

RESULTS

Statistical analysis begins with a prerequisite test, namely the data normality test. Normality test

In this study the number of subjects was less than 50, so the Shapiro-Wilk test was used whose results are presented in table 1.

Table 1. Normality Test Results

Group	Elasticity	P	Information
I	Previous elasticity	0.290	Normal
	Elasticity After	0.867	Normal
II	Elasticity before	0.290	Normal
	Elasticity After	0.714	Normal

Source: primary data (2021))

In this study results of normality test of elasticity values for groups I and II obtained p value > 0.05, then for data normally distributed for the different test used parametric test.

Elasticity difference test between groups I and II

Different test after treatment between groups I and II using the Independent Samples Test. The results of the different test after treatment between groups I and II can be seen in table 2.

Table 2. Independent Sample Test Results Elasticity Value After Treatment Between Groups I and II

P	Information
Elasticity value after treatment in Groups I and II 0.015	there is a significant difference

Source: primary data (2021)

it can be concluded that significant difference the elasticity values after treatment in group I in the form of giving vitamin C serum by iontophoresis method and group II in the form of giving vitamin C serum with massage.

Table 3. Difference in Mean Group I and Group II

	<i>Different meaning</i>
Group I	4.6
Group II	2.5

Source: Primary data (2021)

Table 3 shows the difference in mean in groups I and II. Group I had a higher mean difference before and after treatment, which was 4.6 compared to group II, which was 2.4. Group I treated with vitamin C serum with the iontophoresis method was better at increasing the elasticity of women's facial skin.

DISCUSSION

The results of the study in the group that was given phosphorus ion and serum vitamin C an increase of 4.6 compared to the group given *massage* and vitamin C serum. In the group that was given *massage* and vitamin C serum there was also an increase in elasticity but not as much as in the iontophoresis and vitamin C serum group.

Massage is a structured series of pressure or touch by using the hands on the soft tissues of the body to stimulate sensory receptors and *subcutaneous tissue* on the skin so as to provide a relaxing effect and can reduce facial stiffness (Amanati, Purnomo, & Abidin, 2017). *Massage* on the face can improve blood circulation and increase metabolic processes. The resulting effect of *massage* can help accelerate the absorption of vitamin C into the skin so that it relaxes facial skin, improves skin health and restores facial elasticity. (Alakram & Puckree, 2011). In the group that was given *massage* and vitamin C serum had limitations in penetrating the corneum layer, so that vitamin C serum could not be penetrated into skin cells optimally.

Iontophoresis work on principle that is like repulsion, pushing charged molecules through the skin. Serum delivery to the skin is delivered intradermally via stepwise *iontophoresis* released into circulation to maintain blood concentration after maintaining the movement of skin tissue (Fukuta, Oshima, Michiue, Tanaka, & Kogure, 2020).

The basic principle of *iontophoresis* is the current that moves ions, where the poles with the same charge will repel each other, while the poles with different charges will attract each other. The energy generated by the current conduction can increase the speed of drug penetration through the membrane. Direct current is delivered through a pair of electrodes, one electrode delivers ionizing material, while the other acts as a neutral electrode. When a

positively charged ionizing material is subjected to a current through the positive electrode (cathode), then the material will be rapidly delivered to the negative electrode placed on the body. Topical and transdermal iontophoresis allows hydrosoluble molecules to transit the stratum corneum (SC) more quickly and thereby increases the rate and extent of delivery to the epidermis, dermis and systemic circulation enhances the molecular transport of small molecules into and across skin (Gratieri, Zarhloule, Dubey, & Kalia, 2021).

Serum vitamin C plays an important role in increasing collagen production and decreasing the production of matrix metalloproteinases, the enzyme *pepsin digestin* increases dermal degradation. In an *in vitro study*, each individual's fibroblasts differ according to age. Stimulation of collagen synthesis by vitamin C derivatives (*Ascorbil acid*) will help improve facial skin elasticity (Al-Niami & Yi Zhen Chiang, 2017).

Iontophoresis with Ser-C is easier to penetrate into the stratum corneum through electromigration *iontophoresis technique* which only increases the flow of electrically charged molecules. Ser-C has improved the skin's horny layer and lipids, which makes the structure more fluid and increases skin permeability. The ability of vitamin C serum to repair the horny layer is not enough to beat the *electromigration process which is converted into good molecular ions due to the current the strong one*. The electron drainage is converted into ion flux through the electrode reaction. The process of ion transport through the skin is a process to maintain a neutral electric charge (*electronetrality*) (Wathoni & Panji Luhur, 2012).

Application of current through electrode generate electromigration which causes vitamin C serum molecules to be pushed into or through the skin exerting an effect at the cellular and molecular levels of cells where the presence of precursors with low-intensity galvanic currents can generate heat and energy within cells. that heat and energy is generated through transdermal delivery where the ionizing material in this case the negatively charged vitamin C serum is subjected to a negative electrode current (cathode) with one positive cathode (anode) placed on the body, there will be mutual attraction between the two poles. (Bakshi, Vora, Hemmady, & Banga, 2020). This causes serum vitamin C to penetrate the cell wall (cell membrane) and increase vascularity. It is this increased vascularity that penetrates serum vitamin C through the lipid bilayer to reduce polymerization and increase the permeability of skin cell walls. (Rattanawiwatpong, Wanitphakdeedecha, Bumrungpert, & Maiprasert, 2020). Good Vascularization _ can affect blood circulation in the skin to increase protein production which supports the formation of heat shock protein (HSP). So that it can activate endothelial cells that play a role in producing metalloproteinase I-IV (MTP). Endothelial cells produce MTP II as a nutrient for cell repair and molecules by converting absorbed nutrients into protein materials (HSP) needed by cells and extracellular matrix to form collagen and fibroblast networks. in order glycosaminoglycans (GAGs). Balance energy in cell help control MTP IV activity so that produce MTP III and IV excessive *transepidermal water loss (TEWL)* which causes the skin to become moist and not dry (Calderwood, Murshid, & Prince, 2009).

Vitamin C serum has increased the repair of the skin's horny layer and lipids, which makes the structure more fluid and increases skin permeability. The effect of interpolar iontophoresis occurs because of the difference in electric charge of the 2 poles, namely the cathode (-) and the anode (+). When a negatively charged ionizing material is subjected to a current through the negative electrode (cathode), then the ionizing material will be quickly penetrated due to an attractive current with the positive electrode (anode) placed on the body while the polar effect of iontophoresis increases the metabolism of the skin glands. The absorption of ionizing agents through the lipid bilayer reduces polymerization and increases cell wall permeability (Alexander et al., 2012).

CONCLUSION

Research on the Differences in Effect of Iontophoresis and Massage with the Addition of Vitamin C Serum on Female Facial Skin Elasticity conducted by 30 female subjects from Tohudan Village conducted 2 times per week for 2 weeks in September – October 2021. The results obtained were: Administration of vitamin C serum with The iontophoresis method is more effective than the administration of vitamin C serum with massage in increasing the elasticity of women's facial skin.

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