Factors Affecting the Occurrence of Suspected Contact Dermatitis in the Traditional Fishery Processing Area (PHPT) of Muara Angke

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Abstract: Contact dermatitis is considered trivial for some people. There are many environmental factors could be the main factors causing contact dermatitis on salted-fish processor in Pengolahan Hasil Perikanan (PHPT) or Fishery Processing Area of Muara Angke such as water, temperature, fish, and humidity. These were due to the geographical location of the coastal determine the environmental factors which related to the contact dermatitis suspected on salted-fish processor in the PHPT Muara Angke area. The study was analytic observational with cross sectional design, with subjects were 112 samples. Results showed that 53.6% of salted-fish processor were suspected contact dermatitis. The suspected contact dermatitis increased by poor length of contact (OR= 9.42, 95% CI= 2.91 to 30.53, p=0.000), poor frequency of contact (OR= 4.70, 95% CI= 1.10 to 20.20, p=0.000), and bad temperature (OR= 3.74, 95% CI= 1.34 to 10.45, p=0.003). The length of contact can makes the lack of permeability of the skin, so the material of irritant can infiltrate properly. To prevent contact dermatitis the distribution of clean water must be comprehensive and do as the standards. The building of the processing room has to protect the worker from the heat temperature. Personal hygiene and personal protective must be increase to protect the worker from disease and to keep the quality of the product.

1. Introduction
One of the factors that affects health is the environment. Environmental health is all physical, chemical, and biological factors outside the body that affect behavior including assessment and control that have the potential to affect health [45].

Many environmental exposures can affect the skin, thereby reducing the mechanism of skin regulation and skin repair that cause dermatological diseases [26]. Skin is a part of the body that often receives damages from work, one of which is the work of processing fish. The work of the majority of Muara Angke residents, one of many regions in North Jakarta Indonesia, is fisherman or fish trader due to the geographical location on the coast. One disease that can attack fish processors is a skin disorder such as dermatitis. Dermatitis is an inflammatory reaction that occurs on the skin in response to exogenous and endogenous influences. Contact dermatitis is a dermatitis caused by a substance or substance that attaches to the skin [10]. Symptoms of contact dermatitis can be itchiness, redness, flaking of the skin, to the appearance of vesicles. In Jakarta, dermatitis is found in 100 people per 1000 population.
results of the 2007 RISKESDAS also suggested that there were 80.3 cases of dermatitis per 1000 residents in the North Jakarta area. Although North Jakarta is not the region with the most dermatitis in Jakarta, but in publications carried out by Floating Hospital Dr. Lie, from 631 patients in Muara Angke on March 16, 2014 it was noted that dermatitis was the second most common disease after ARI (Acute Respiratory Infection). In the initial survey of researchers on November 18, 2017, it was found that 3 out of 5 salted fish processors experienced symptoms of contact dermatitis such as itchiness and redness. Contact dermatitis can occur due to repeated contact with weak irritants, one of which is water [10], while water is one of the basic elements and is needed for human life [36]. The coastal area is an area that often experiences difficulties with clean water. The 2017 Geological Agency of the Ministry of Energy and Mineral Resources stated that 80% of groundwater in the Jakarta Groundwater Basin (CAT) area did not meet the Minister of Health's standard No.492 of 2010 concerning Requirements for Qualification of Drinking Water. North Jakarta is the worst area where in general the CAT contains high levels of Fe (iron) and the content of Na (Sodium), Cl (Chloride), TDS (Total Dissolve Solid) and DHL (Electrical Conductivity) due to the influence from water intrusion. These elements can be potential irritants / allergens that heavy metals (metals) are the most common materials causing allergic contact dermatitis [24]. The type of dug well water source (groundwater) affected the incidence of dermatitis in Kedungrandu Village, Banyumas [18].

It is not impossible that this can happen in Muara Angke where groundwater quality data is indeed bad. Heavy metals can also be found in marine fish as the main ingredient in processed salted fish. The Jakarta Bay is one of the world's bays that has marine pollution, which resulted in some of the marine products being polluted including the fish. [25]. There was contamination of lead (Pb) and cadmium (Cd) in a number of fishes in Jakarta Bay [25], while it was proven that several types of fishes contain elements of mercury (Hg) [13], [32], although from these studies it is said that it is still below the threshold according to Minister of Health Regulation 492 of 2010 but if contacted repeatedly it is not impossible to cause contact dermatitis in salted fish processors.

Coastal areas are low-lying areas that results in the air temperature being hotter than other plains. One of the factors that influence the onset of contact dermatitis is temperature [10]. According to the Indonesian Meteorology and Climatology Agency (BMKG) the temperature in North Jakarta reaches 24-33˚C. An average temperature of Muara Angke is 27.7˚C which is quite hot. It was proven that the temperature was related to the incidence of contact dermatitis in tofu makers [12]. Besides temperature, humidity is also one of factors that influence the emergence of contact dermatitis [10]. The Tanjung Priok Maritime Meteorological Station for the North Jakarta region in 2013 recorded an average air temperature of 28.7˚C with a maximum temperature of 35.4˚C and a minimum temperature of 23˚C. Average humidity is 75% with a maximum humidity of 97% and a minimum humidity of 42%. The high temperature and humidity can affect the symptoms of contact dermatitis.

Based on the above and seeing that the majority of fish processors are salted fish processors, the researchers wanted to examine environmental factors related to the incidence of suspected contact dermatitis in the processing of salted fish in the Muara Angke Traditional Fisheries Processing Area (PHPT) North Jakarta in 2018.

2. Methodology
2.1. Research Design
The research conducted was observational analytic. Observations of salted fish processors in the PHPT area were carried out using cross sectional data collection techniques, where the dependent variable and independent data are observed at the same time period. The researcher will ask the sample using a modified questionnaire from various validated sources.

2.2. Population And Samples
The population of this study was the salted fish processor in the Muara Angke PHPT area which had agreed to become a research sample and entered into the inclusion criteria. The number of samples used in this study were 112 samples. The processing houses to be studied are 56, so that each
processing house is taken by two respondents. The inclusion criteria for this study were the salted fish processors in the PHPT Muara Angke area in which they were willing to be sampled, salted fish processors who had at least become processors for \(-1\) year, salted fish processors working without using personal protective equipment rubber gloves and shoes, and salted fish processors with ages 18 to 64 years (productive age according to the Central Bureau of Statistics)

2.3. Data Collection Hygrometer
The type of data used in this study is the primary data, which was taken through questionnaires that have been tested for validity and reliability. Questionnaire to determine whether the respondent is suspected of contact dermatitis. The questionnaire will be examined by a doctor at the Pluit Health Center as a related health facility to determine the diagnosis of salted fish processing. Also a direct assessment of temperature and humidity with a thermo.

3. Result And Discussion
3.1. Respondent Characteristics
Male respondents are 79 (70.5%) more than female respondents. The highest age of respondents was the age range of 31-40 years at 47 (42.0%). Although that male skin is much thicker than a woman's skin which causes women to be more susceptible to contact dermatitis but this is due to more overall male workers in the Muara Angke Traditional Fisheries Processing Area [28]. In the analysis of the characteristics of the respondent's age the most were ages with a range of 31-40 years which amounted to 47 with a percentage of 42%. Based on researchers' observations this can be due to younger age workers who prefer other jobs such as online motorcycle or online taxi, etc. Given that work as a fish processor is included as heavy labor, is also the cause of fish processors being above the age of 40 years less.

3.2. Univariate Analysis
a. The results of the primary data that have been examined by doctors of the Pluit Health Center show that as many as 60 salted fish processors were suspected of contact dermatitis with a percentage of 53.6% while as many as 52 salted fish processors were not suspected contact dermatitis with a percentage of 46.4%. This is in accordance with the publication of the 2007 RISKESDAS which stated that there were 80.3 cases of dermatitis per 1000 residents in the North Jakarta area. Although North Jakarta is not the region with the most dermatitis in Jakarta, but in publications conducted by the Floating Hospital Dr. Lie, 631 patients in Muara Angke on March 16, 2014 it was noted that dermatitis was the second most common disease after ARI. Also added to the number of potential environmental factors of contact dermatitis that researchers observed in the processing of salted fish in the Muara Angke Traditional Fisheries Processing Area can be one of the causes of the many processes that are suspected of contact dermatitis. Contact dermatitis is dermatitis caused by a substance that attaches to the skin. Two types of contact dermatitis are known, namely irritant contact dermatitis and allergic contact dermatitis. Both can be acute or chronic [10].

b. In the study it was found that the source of water used for processing salted fish is mostly derived from groundwater. From the results of the analysis, 46 (82.1%) processing houses used groundwater sources while only 10 (17.9%) processing houses used other water sources. This was in accordance with the second survey that researchers conducted on April 20, 2018 that most fish processors still use a lot of ground water as their source of water due to lack of costs and the ability to use PAM Jaya water flow, and PAM Jaya has not been able to meet the needs of clean and evenly distributed water [36].

c. There were 30 processors (26.8%) with length of contact of more than 5 hours, followed by 30 processors (26.8%) with length of contact 5-10 hours and as many as 52 processors (46.4%) with a contact duration of more than 10 hours in a day

d. There were 16 processors (14.3%) with contact frequency <5 times, 41 (36.6%) processors with contact frequency 5-10 times, and 55 processors (49.1%) with contact frequency more than 10 times a day. The large number of respondents with long contact duration and frequent contact frequency due to a long and frequent treatment process in a day. This makes the two variables potentially a factor associated with suspected contact dermatitis.
e. The temperature and humidity of the processing room has an inversely proportional state. At room temperature analysis 36 (64.3%) the processing house with temperature is not optimal. The average temperature is 30.014˚C with a minimum temperature of 25.0˚C and a maximum temperature of 33.2˚C. While only 14 (25.0%) processing houses with humidity are not optimal with an average humidity of 74.25% as well as a minimum humidity of 60.0% and maximum humidity of 97.0%. This is due to the condition of processing houses that cannot withstand the temperature of hot air from outside caused by building materials that still use plywood boards as the main material for processing houses. Meanwhile the dominant temperature of the room's hot air causes the humidity of the room is quite optimal even though there are some processing houses that have moisture below the value due to the heat of the home processing temperature. These two variables can also be the main factors causing contact dermatitis in salted fish processors.

3.3. Bivariate Analysis

Bivariate Chi-square analysis showed that there was no significant association between groundwater sources and the incidence of suspected contact dermatitis with p value = 0.396 (p>0.05). It can be due to the different frequency of contact of each fish processor to groundwater sources so that there are several salted fish processors which, although using ground water as a source of water, do not show symptoms of contact dermatitis. As stated that contact dermatitis can occur due to repeated contact with weak irritants, one of which is water [10]. The results of the bivariate Chi-Square analysis also showed a p value of 0.677 (p>0.05) which indicated that there was no association between the humidity of the processing house with suspected contact dermatitis in salted fish processing in the PHPT Muara Angke Region.

Table 1. Association between length of contact and Suspected Contact Dermatitis in Traditional Fishery Processing Area PHPT Muara Angke

| duration of contact | Suspected Contact Dermatitis | No Suspected Contact Dermatitis | P Value |
|---------------------|-----------------------------|---------------------------------|---------|
|                     | n   | %   | n   | %   |       |
| >5 hours            | 8   | 7.1 | 22  | 19.6| 0.000 |
| 5-10 hours          | 10  | 8.9 | 20  | 17.9|       |
| > 10 hours          | 42  | 37.5| 10  | 8.9 |       |
| Total               | 60  | 53.6| 52  | 46.4|       |

The Chi-square analysis performed showed a significant relationship between length of contact and the incidence of suspected contact dermatitis with a p value = 0.000 (p<0.05). This result is in accordance where contact time is one of the factors causing contact dermatitis [10]. This result is also found a significant relationship between the duration of contact with the incidence of contact dermatitis [46]. This might mean that there was a long contact with the substance in the form of heavy metals that exist in marine fish which, although below the threshold, but with prolonged contact will make it take longer - even if in a small amount for a long period of time it will enter into the skin and cause inflammation so that the length of contact with the suspected incidence of contact dermatitis has a significant relationship.
| Contact frequency | Suspected Contact Dermatitis | No Suspected Contact Dermatitis | P Value |
|-------------------|-----------------------------|---------------------------------|---------|
| n     | %   | n     | %   |       |
| >5 Kali | 4   | 3.6   | 12   | 10.7  | 0.000 |
| 5-10 Kali | 15  | 13.4  | 26   | 23.2  |       |
| > 10 Kali | 41  | 36.6  | 14   | 12.5  |       |
| Total   | 60  | 53.6  | 52   | 46.4  |       |

In table 2, showed the value of p value of 0.000 (p <0.05) which indicates that there is an association between the frequency of contact with suspected contact dermatitis in salted fish processor. Frequencies will often induce sensitization to the skin so that if the worker is sensitized even if only a small amount of substance is exposed, it can cause contact dermatitis [10]. Other studies also show that the frequency of contact is related to contact dermatitis [12]. Just like contact time, the frequent frequency of marine fish suspected of being contaminated with heavy metals can cause contact dermatitis in salted fish processors even though the amount of the ingredients is small. High frequency contact can emerge the sensitization phase to the substance on the skin, causing allergic contact dermatitis.

Table.3. Association between temperature and suspected contact dermatitis in traditional fishery processing area PHPT Muara Angke

| Processing house temp | Suspected Contact Dermatitis | No Suspected Contact Dermatitis | P Value |
|-----------------------|-----------------------------|---------------------------------|---------|
| n     | %   | n     | %   |       |
| Optimal temp | 20  | 35.7  | 26   | 23.2  | 0.003 |
| No Optimal temperature | 40  | 41.1  | 26   | 23.2  |       |
| Total   | 60  | 53.6  | 52   | 46.4  |       |

In this temperature variable the results of the bivariate Chi-Square analysis showed a p value of 0.003 (p <0.05) which indicated that there was a relationship between the processing house temperature and suspected contact dermatitis in salted fish processors. Only 20 salted fish processing houses have optimal temperatures with a percentage of 35.7%. The average temperature is 30,014˚C where about healthy industrial site requirements the optimum temperature ranges from 18-30˚C [21]. This result is in accordance where temperature is also affecting contact dermatitis [10]. Temperatures that are not optimal can facilitate the entry of substances from the environment into the skin [14]. The temperature also became one of the variables that had a relationship with the incidence of contact dermatitis in the custodians of Kaasan Ciputat [12]. The less optimal room temperature is probably caused by processing house buildings that are only made of plywood and wood so that it is less able to maintain the temperature of the room from coastal attacks of hot air.

The results of bivariate Chi-Square analysis showed a p value of 0.677 (p> 0.05) which indicated that there was no relationship between processing house moisture and suspected contact dermatitis in salted fish processors. This is due to the fact that most of the processing house moisture is in the optimal humidity range, which is 65% - 90% [20]. Only 14 processing houses with humidity were not
optimal with a percentage of 25.0%. With an average humidity of 74.25% which was still within the optimal humidity range. This optimal humidity was likely to be affected by hot weather which causes moisture to be maintained.

3.4. Multivariate Analysis

| Table. 4 | Length of contact, Frequency of contact, temperature against Suspected Contact Dermatitis |
|----------|--------------------------------------------------------------------------------------|
| OR CI lower  | 95% upper | p |
| Length of contact | 9.42     | 2.91 | 30.53 | 0.000 | |
| Frequency contact | 4.70     | 1.10 | 20.20 | 0.000 | |
| temperature | 3.74     | 1.34 | 10.45 | 0.003 | |

From the multivariate analysis of logistic regression, the results obtained with the smallest p value were (p <0.005) in the variable length of contact (OR= 9.42, 95% CI= 2.91 to 30.53, p=0.000), frequency of contact (OR= 4.70, 95% CI= 1.10 to 20.20, p=0.000) and temperature (OR= 3.74, 95% CI= 1.34 to 10.45, p=0.003). The contact length Odds Ratio values was the highest with 9.42 which means that salted fish processors with a contact time> 10 hours 9.42 times were more at risk of being suspected of contact dermatitis than salted fish processors with a contact duration of 5-10 hours. Based on the above, it can be said that length of contact is the variable that most influences the occurrence of suspected contact dermatitis. This result is in accordance with the theory where contact time was one of the factors causing contact dermatitis [10]. The presence of sea water pollution makes some types of marine fish contaminated with heavy metals [43]. There was contamination of Lead (Pb) and Cadmium (Cd) metals in a number of fish in Jakarta Bay Several types of fish contain elements of Mercury (Hg) [13] [32]. Even though these studies were said to be still below the threshold according to Minister of Health Regulation 492 of 2010, the substance in the form of heavy metals that exist in marine fish even though it was below the threshold, but with prolonged contact, it can create a substance which, although in small amounts, will enter the skin and cause inflammation so the contact duration of suspected contact dermatitis had a significant relationship. The sensitizing phase can occur along with the length of contact with the heavy metal, causing allergic contact dermatitis [14].

4. Conclusion

Based on this study it can be concluded that the suspected contact dermatitis increased by poor length of contact, poor frequency of contact and bad temperature in traditional salted fish processors at the Muara Angke PHPT area. The nature of marine fish that has sharp scales can also make physical trauma to fish processors so that heavy metal substances present in fish can enter and make inflammation of the skin for a long time so contact dermatitis occurs.

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