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Abstract- In Japan, many food poisoning cases occur every year form the rainy season to summer. After all, restaurants account for about 50% of all food poisoning cases. Still they also occur at school meals (6.4%) and hospitals (0.6%), where hygiene management should strictly controlled in the Ministry of Health, Labor, and Welfare announced (2019). Therefore, from the viewpoint of food poisoning prevention, this study focused on the stove knob and water faucet, which are often touched by the cook's fingers in the kitchen and may cause secondary contamination. The effect of hygiene education investigated by measuring invisible microbial load as visible ATP value using ATP wiping test. The 12 stove knob and 11 water faucet inspected before and after hygiene education by using the ATP wiping test. Before hygiene education, the average value of the ATP values measured after washing before and after washing. To the surprise, after washing, the ATP value did not drop below 1000 for Stove knob and Water faucet. Almost the same ATP value as before cleaning.

Keywords: *gender; ATP wiping test, stove knob, water faucet, Hygiene education, double wash.*

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Results of Hygiene Education of Kitchen Stove Knob and Water Faucet by using ATP Inspection

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Abstract- In Japan, many food poisoning cases occur every year form the rainy season to summer. After all, restaurants account for about 50% of all food poisoning cases. Still they also occur at school meals (6.4%) and hospitals (0.6%), where hygiene management should strictly controlled in the Ministry of Health, Labor, and Welfare announced (2019). Therefore, from the viewpoint of food poisoning prevention, this study focused on the stove knob and water faucet, which are often touched by the cook's fingers in the kitchen and may cause secondary contamination. The effect of hygiene education investigated by measuring invisible microbial load as visible ATP value using ATP wiping test. The 12 stove knob and 11 water faucet inspected before and after hygiene education by using the ATP wiping test. Before hygiene education, the average value of the ATP values measured after washing before and after washing. To the surprise, after washing, the ATP value did not drop below 1000 for Stove knob and Water faucet. Almost the same ATP value as before cleaning. It turned out that the number of microorganisms did not decrease even if the cooks cleaned themselves. Then, the inspector wash the stove knob and water faucet firmly with detergent and sponge, wipe clean with a clean cloth three times or more. The inspector taught the cooks to repeat this process twice. The cook tries to do it as same as the inspector is doing. Then, the cook tries to do it next cooking. After hygiene education, the average value of the ATP values was significant low. Unfortunately, after washing, the ATP value did not drop below 100 for the Stove knob and Water faucet. Even after the hygiene education, the ATP value did not fall below 100, an indication that more rigorous hygiene education is necessary.

Keywords: gender; ATP wiping test, stove knob, water faucet, Hygiene education, double wash.

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I. Introduction

Outbreaks of food poisoning often involve cooking and providing food together, for example, school lunches, employee cafeterias, and inns with meals. Therefore, to the Japanese Ministry of Health, Labor, and Welfare, it is necessary to strictly management of hygiene. HACCP (Hazard Analysis Critical Control Point) is a base method of the hygiene management. NASA used this system to prevent Hazards related to food handling in advance. This HACCP has 12 items, and the 9th measurement method (monitoring) setting[1]. Currently, the ATP wipe test used to control microorganisms in hospitals and food companies[2,3,4]. Food poisoning in elderly facilities is likely to cause death; this is a reason why hygiene education for the staff is essential[5]. Since microorganisms are invisible, it is possible to count the number of bacteria as the number of ATP by using the ATP wiping test. This test is very useful for health education. The cook's fingers touch many places in the kitchen. And, depending on the place, there are places where the fingers of multiple cooks touched many times. For example the place, a stove knob or a water faucet. Therefore, it is necessary to repeat the hygiene education of the cooks and give a careful explanation about the places where the cook's fingers touch. The purpose of this study, the effect of hygiene education for cooks by conducting an ATP wiping test on the stove knob and water faucet installed in the kitchen.

II. Materials and Methods

a) Stove knob and Water faucet

The 12 stoves knob and 11 water faucet, prepared in the kitchen were wiped clean before the start of cooking. The stove knob ignites as it releases gas when pressed. So, every time the stove lit, the cook's finger will touch the stove knob. Similarly, the water faucet is the place where the cook's finger touches each time to uses water. Five cooktops have two stove knob and two water faucet, and one cooktop has two stove knob and one water faucet.

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b) ATP inspection procedure

Twelve cooks worked in groups of two to cook on six cooktops. Before the education of hygiene, the work start time depends on the working conditions of the cooks, but the inspector always performed an ATP inspection before using the 12 stove knob and 11 water faucet. Then, each cook finished the work, washed the 12 stove knob and 11 water faucet by himself, and they inspected the ATP inspection by inspector again. The value of ATP recorded. In the same way, after the education of hygiene, the work start time depends on the working conditions of the cooks. Still the inspector always performed an ATP inspection before using the 12 stove knob and 11 water faucet. Then, each cook finished the work, washed the 12 stove knob and 11 water faucet by himself, and they inspected the ATP inspection by inspector again. The value of ATP recorded.

III. Hygiene Education Procedure

a) Cleaning instruction

While showing the ATP result before the hygiene education to the cook, ATP inspector the stove knob and the water faucet firmly with detergent and sponge, wipe clean with a clean cloth three times or more. Then, the inspector washes again the stove knob and water faucet carefully with detergent and sponge, wipe clean with a clean cloth three times or more. The cook tries to do it as same as the inspector is doing. Then, the cook tries to do it next cooking. After the educational, results of ATP recorded.

b) Statistical processing

The results obtained compared using statistical methods. The data to be compared was subjected to an F test to determine whether to use a parametric test or nonparametric test. When there is no difference in the F test, the presence or absence of a significant difference was confirmed using the student-t-test with or without a correspondence. If there was a difference in the F test, the presence or absence of a significant difference was confirmed using the Wilcoxon test with a pair or the Mann-Whitney test without correlation.

IV. Results

a) Before hygiene education: Stove knob and Water faucet

The results of ATP wiping tests on the stove knob and the water faucet before hygiene education shown in Table 1 and Table 2. It can see that the average value of the ATP values measured after washing before and after washing and washing little bit lowers the ATP value. To the surprise, after cleaning, the ATP value did not drop below 1000 for Stove knob and Water faucet. Almost the same ATP value as before cleaning.

Table 1: ATP test result of the stove knob before cleaning instruction

	before cleaning instruction	
Place	before	after
stove 1	2730	285
stove 2	1178	356
stove 3	21	409
stove 4	1593	432
stove 5	6279	478
stove 6	1254	493
stove 7	388	906
stove 8	634	1013
stove 9	496	1131
stove 1 0	1672	1644
stove 1 1	8837	3677
stove 1 2	774	4204
Average	2154.67	1252.33
Standard deviation	2679.07	1322.4
Median	1216	699.5
Maximum	8837	4204
Minimum	21	285

Table 2: ATP test result of water faucet before cleaning instruction

	before cleaning instruction	
Place	before	after
water supply 1	574	428
water supply 2	8848	531
water supply 3	877	554
water supply 4	6122	709
water supply 5	2495	1639
water supply 6	1850	3758
water supply 7	54	4227
water supply 8	2795	4442
water supply 9	908	4922
water supply 1 0	5499	6306
water supply 1 1	28180	19893
Average	5291.09	4309.91
Standard deviation	8071.87	5577.43
Median	2495	3758
Maximum	28180	19893
Minimum	54	428

b) After hygiene education: Stove knob and Water faucet

The results of ATP wiping tests on the stove knob and the water faucet after hygiene education shown in Table 3 and Table 4. It can see that the average value of the ATP values measured after washing before and after washing and the ATP value significantly low. Unfortunately, after washing, the ATP value did not drop below 100 for the Stove knob and Water faucet.

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Table 3: ATP test result of the stove knob after cleaning instruction

	after cleaning instruction	
Place	before	after
stove 1	102	25
stove 2	137	26
stove 3	344	31
stove 4	630	32
stove 5	902	36
stove 6	5643	59
stove 7	2157	139
stove 8	293	167
stove 9	39	172
stove 1 0	949	203
stove 1 1	448	232
stove 1 2	875	245
Average	1043.25	113.917
Standard deviation	1559.37	87.4855
Median	539	99
Maximum	5643	245
Minimum	39	25

Table 4: ATP test result of water faucet after cleaning instruction

	after cleaning instruction	
Place	before	after
water supply 1	153	1
water supply 2	187	9
water supply 3	1596	15
water supply 4	91	15
water supply 5	619	25
water supply 6	183	110
water supply 7	116	114
water supply 8	3802	126
water supply 9	54131	200
water supply 1 0	712	315
water supply 1 1	794	338
Average	5671.27	115.273
Standard deviation	16109	122.242
Median	619	110
Maximum	54131	338
Minimum	91	1

c) *Statistical processing results*

i. *Comparison of ATP test values of Stove knob and Water faucet: before and after education*

Before and after hygiene education, the results of the ATP wiping test on the stove knob and the water faucet statistically compared. The results shown in Tables 5 and 6. The ATP wiping test values after hygiene education for the stove knobs and the water faucet were statistically significant difference. Although there was a statistically significant difference even before hygiene education, the ATP wiping test values for both were not less than 100, so it can say that hygiene is still insufficient.

Table 5: Statistical comparison results : ATP test results of stove knob before andafter cleaning instruction

	before cleaning instrucion		after cleaning instruction	
	before cooking	after cooking	before cooking	after cooking
Average	2154.7	1252.3	1043.3	113.9
Standard deviation	2679.1	1322.4	1559.4	87.5
F test	p = 0.011*		p=0.0001**	
Student-t test				
Wilcoxon test	p=0.239		p=0.006**	

* P<0.05, ** P<0.01

Table 6: Statistical comparison results : ATP test results of water faucet before and after cleaning instruction

	before cleaning instrucion		after cleaning instruction	
	before cooking	after cooking	before cooking	after cooking
Average	5291.1	4309.9	5671.3	115.3
Standard deviation	8071.9	5577.4	16109.0	122.2
F test	p = 0.118		p=0.0001**	
Student-t test	p=0.481			
Wilcoxon test			p=0.003**	

* P<0.05, ** P<0.01

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V. Discussion

The ATP test is a quick test because it can show the number of microorganisms by the ATP amount within one minute[6,7]. Many hospitals have adopted this method to help maintain a hygienic environment[8]. In this study, the ATP wiping test used to inspect the stove knob and water faucet in the kitchen. The ATP wiping test used to show the number of microorganisms to the cooks, and the hygiene education conducted. The ATP value after washing the stove knob and water faucet before hygiene education showed almost the same ATP value as before cooking. The ATP value did not drop below 1000 for Stove knob and Water faucet. It is not change as ATP value as before cleaning. The microorganisms could not be removed by the cook's washing. However, after the hygiene education by the demonstration of the washing method by the inspector, hygienic cleaning with a statistically significant difference was achieved. Although there was a statistically significant difference even before hygiene education, the ATP wiping test values for both were not less than 100, so it can say that hygiene is still insufficient. It found that cooks need to regularly clean stove knobs and water faucet that is touched by multiple cooks even during cooking, and wipe with a clean cloth three or more times.

Although it has said that food poisoning is unlikely to occur during the cold season, Japan's Ministry of Health, Labor, and Welfare had revealed that noroviruses often occur in winter. Also, according to the announcement from the National Institute of Infectious, there are food poisoning s caused by dysentery, cholera, typhoid, salmonella, and pathogenic Escherichia coli as import infectious diseases brought in from overseas. Food poisoning occurs when various factors such as foodstuffs, cooking utensils, fingers of cooks, and temperature and humidity of food storage overlap. To prevent this, such a cook needs to be highly aware of the hygiene management. Also, it is necessary to maintain hygiene management awareness by regularly measuring the ATP value using the AYP wiping test so that invisible microorganisms can see.

VI. Conclusions

To prevent food poisoning, which may cause fatal accidents in some cases, we examined ways to improve instruction of hygiene education. The effect of hygiene education investigated by measuring invisible microbial load as visible ATP value using ATP wiping test. The 12 stove knob and 11 water faucet inspected before and after hygiene education by using the ATP wiping test. Before hygiene education, the average value of the ATP values measured after washing before and after washing. To the surprise, after washing, the ATP value did not drop below 1000 for Stove knob and Water faucet. There was no statistically significant difference between the ATP values measured at the start of cooking and after washing after completion. The ATP value is almost the same as before cleaning. It turned out that the number of microorganisms did not decrease even if the cooks cleaned themselves. Then, the inspector washes the stove knob and water faucet firmly with detergent and sponge, wipe clean with a clean cloth three times or more. The inspector taught the cooks to repeat this process twice. The cook tries to do it as same as the inspector is doing. Then, the cook tries to do it next cooking. After hygiene education, the average value of the ATP values was significant lowers. Unfortunately, after washing, the ATP value did not drop below 100 for the Stove knob and Water faucet. However, the ATP value was statistically significant. Even after the hygiene education, the ATP value did not fall below 100, an indication that more rigorous hygiene education is necessary.

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