

UNIVERSITI PUTRA MALAYSIA

MICROBIOLOGICAL QUALITY OF FOODS SERVED DURING MALAY WEDDING BANQUETS, AND RELATIONSHIP WITH FOOD SAFETY KNOWLEDGE OF FOOD HANDLERS

NOR AISYAH BT AHMAD

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By

NOR AISYAH BT AHMAD

Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfillment of the Requirements for the Degree of Master of Science

April 2018



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DEDICATION



5

Specially dedicated to my abah and mak my soul mate : Saiful Anuar for their love and support Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment of the requirement for the degree of Master of Science

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Food poisoning is a critical problem to public health, and is increasingly reported in Malaysia. One of the major causes for food poisoning is wedding banquets. Foodborne outbreak related to wedding banquet was reported on September 30th, 2013 which caused three deaths, two in critical condition and about sixty hospitalizations after attending a wedding banquet at Sungai Petani, Kedah. Compiling and analysing the data on food poisoning cases from wedding banquets and their root causes is thus important in providing the general idea on the safety status of foods being served. The aim of the present work was therefore to identify the relationship between microbiological quality of the foods served during a wedding banquet and the temperature control awareness among its food handlers. The two selected Malay wedding banquets were each prepared by commercial catering services and 'rewang' activity (a group of voluntary cook from the local community) in Selangor. Three types of dish (chicken, vegetable and cooked rice) were sampled from both banquets and analysed for Total Plate Count (TPC), Total Coliform, Escherichia coli, Staphylococcus aureus, Bacillus cereus, Salmonella, and Listeria monocytogenes. The dishes that have been taken are chicken curry, *pajeri nanas* and cooked white rice. The dish samples were taken at 0, 1, 2, 3 and 4 h after serving. The drink sample was analysed for Total Coliform and E. coli. The utensils used during the wedding banquet were analysed for TPC. A food safety knowledge questionnaire was



completed by selected food handlers by using face to face interview. The questionnaire was performed to know the understanding of the food handlers and also their operational behaviour and personal routine. The results reveal that at 0 h the microbial load was already high for both catering and *rewang*. For catering, the TPC for chicken, vegetable and cooked rice at 0 h were 6.39, 6.21 and 7.13 log₁₀ CFU/g respectively. For rewang, the TPC for chicken, vegetable and cooked rice at 0 h were 6.54, 6.13 and 7.63 log₁₀ CFU/g respectively. None of the samples were contaminated with Salmonella sp. or Listeria sp. Total Coliform obtained from catering for drink was 4.40 log₁₀ CFU/mL and for rewang was 3.10 log₁₀ CFU/mL. The temperature of foods during the serving times averaged between 30°C-50°C which were conducive for bacterial proliferation. The questionnaire respondents from the catering services mostly have attended food safety seminar whereas respondents from the rewang never attended any food handling training. The result shows that 26.7% attended the training whereas 73.3% did not attend any food handling training. However, both categories appeared unconcerned about temperature control during food preparation and serving. About 93.3% respondent do not monitor food temperature during cooking process. This could relate to the high microbial contamination observed. Even though the selected food handlers have attended food safety training but their awareness toward the importance of temperature control was still lacking.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Master Sains

KUALITI MIKROBIOLOGI DALAM MAKANAN YANG DIHIDANG SEMASA JAMUAN PERKAHWINAN MELAYU DAN HUBUNGAN DI ANTARA PENGETAHUAN KESELAMATAN PENGENDALI MAKANAN TERHADAP PENGENDALI MAKANAN

Oleh NOR AISYAH AHMAD April 2018

Pengerusi : Nor khaizura binti Mahmud @ Ab Rashid, PhD Fakulti : Sains dan Teknologi Makanan

Keracunan makanan adalah masalah kritikal kepada kesihatan awam, dan dilaporkan meningkat di Malaysia. Salah satu penyebab utama keracunan makanan adalah kenduri kahwin. Satu kejadian keracunan makanan di kenduri kahwin telah dilaporkan pada 30hb September, 2013 dimana menyebabkan belakunya tiga kematian, dua dalam keaadaan kritikal dan 60 orang dimasukkan ke hospital selepas menghadiri majlis kenduri di Sungai Petani, Kedah. Pengumpulan dan analisa data keracunan makanan dan penyebabnya penting untuk memberi idea mengenai status keselamatan makanan yang dihidang semasa kenduri kahwin. Oleh itu, matlamat kajian ini adalah untuk mengenalpasti hubungan antara kualiti mikrobiologi dalam makanan yang dihidangkan semasa kenduri kahwin dan pengetahuan tentang kawalan suhu dalam kalangan pengendali makanan. Kajian ini dijalankan di dua majlis perkahwinan masyarakat melayu yang masingmasing disediakan oleh perkhidmatan katering dan juga rewang (kumpulan tukang masak sukarela di sesebuah kampung) di Selangor. Tiga jenis hidagan (ayam, sayur dan nasi) diambil dari kedua-dua kenduri dan dianalisa bagi kehadiran Jumlah Kiraan Plat, Jumlah Colifom, Escherichia coli, Staphylococcus aureus, Bacillus cereus, Salmonella, and Listeria monocytogenes. Sampel yang telah diambil ialah kari ayam, pajeri nanas dan nasi putih. Sampel hidangan diambil pada 0, 1, 2, 3 dan 4 jam setelah makanan dihidang. Sampel minuman dianalisa bagi kehadiran Jumlah Kiraan Plat dan *E. coli*. Pekakas yang digunakan semasa kenduri kahwin juga diambil untuk analisa Jumlah Kiraan Plat. Satu soalselidik pengetahuan keselamatan makanan dijalankan kepada pengendali makanan yang terpilih mengunakan kaedah temubual bersemuka. Soalselidik ini dijalankan untuk mengetahui pemahaman pengendali makanan serta tingkah laku rutin peribadi mereka. Keputusan mendedahkan, hidangan pada jam 0 didapati tinggi dengan bebanan mikrob di kedua-dua kenduri menggunakan katering dan rewang. Untuk katering, Jumlah Kiraan Plat untuk ayam, sayuran dan nasi pada jam 0 adalah 6.39, 6.21 and 7.13 log₁₀ CFU/g. Untuk rewang, Jumlah Kiraan Plat untuk ayam, sayuran dan nasi pada jam 0 adalah 6.54, 6.13 and 7.63 log₁₀ CFU/g. Sampel katering dan rewang tidak tercemar dengan Salmonella sp. atau Listeria sp. Jumlah Colifom dari katering untuk sampel minuman adalah 4.40 log10 CFU/mL dan untuk rewang 3.10 log10 CFU/mL. Suhu makanan yang dihidang adalah di antara 30°C-50°C iaitu suhu yang berkembangbiak. kondusif untuk bakteria Kebanyakan responden soalselidik katering telah menjalani latihan pengendalian makanan manakala pengendali makanan rewang pula tidak pernah menjalani latihan pengendalian makanan. Keputusan menunjukkan 26.7% telah menjalani latihan pengendalian makananan manakala 73.3% tidak menjalani latihan pengendalian makanan. Walau bagaimanapun, pengendali makanan dari kedua-dua kategori tidak mengambil berat tentang kawalan suhu semasa penyediaan makanan dan semasa hidangan. 93.3% tidak memantau suhu makananan semasa proses memasak. Ini boleh dikaitkan dengan pencemaran bakteria yang tinggi di dalam makanan. Kesedaran terhadap kepentingan kawalan suhu masih kurang walaupun pengendali makanan itu telah menghadiri latihan pengendalian makanan.

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I certify that a Thesis Examination Committee has met on 30 April 2018 to conduct the final examination of Nor Aisyah bt Ahmad on her thesis entitled "Microbiological Quality of Foods Served During Malay Wedding Banquets and Relationship with Food Safety Knowledge of Food Handlers" in accordance with the Universities and University Colleges Act 1971 and the Constitution of the Universiti Putra Malaysia [P.U.(A) 106] 15 March 1998. The Committee recommends that the student be awarded the Master of Science.

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LIST OF ABBREVIATIONS

ANOVA	Analysis of Variance
BPW	Buffered Peptone Water
CFU/cm	Colony Forming Unit/centimetre
CFU/g	Colony Forming Unit/gram
CFU/mL	Colony Forming Unit/millilitre
FDA	Food and Drug Administration
HE	Hektoen Enteric
LEB	Listeria Enrichment broth
μm	Micrometre
ml	Millilitre
%	Percentage
PALCAM	Polym <mark>yxin Acriflavin Lithium chloride Ceftazidime</mark> Aesculin Mannitol
PCA	Plate Count Agar
PEMBA	Polymyxin Pyruvate Egg Yolk Mannitol Bromothymol Blue Agar
RV	Rappaport Vasiliadis
TPC	Total Plate Count
aw	Water Activity
WHO	World Health Organisation

CHAPTER 1

INTRODUCTION

Food safety is the ultimate goal in global public health of which foodborne diseases are a major threat (Velusamy, Arshak, Korostynska, Oliwa, and Adley, 2010). Food poisoning, the primary cause for foodborne diseases, is very crucial because it significantly impacts on the economic and trade of any country including Malaysia. In Malaysia, reported cases of food poisoning are increasing annually due to the suitable temperature and condition for the growth of most bacteria (Abdul-Mutalib et al., 2015). One of the sources of food poisoning that has been reported was during wedding banquets. For example, a salmonellosis outbreak causing three deaths in northern Malaysia after having a meal at a wedding banquet was reported in 2013 (Ramli, 2013).

In Malaysia, wedding banquets are prepared either by commercial catering services or *rewang* (voluntary food preparation by the local community at which the wedding takes place). Both categories have different methods of food preparation. For catering, the food preparation is usually indoor and within the business premises using commercial equipment and utensils whereas for *rewang*, food preparation is usually outdoor under makeshift tents where the locals come and go while preparing the dishes. Therefore, certain safety concerns in terms of hygienic practices might arise during *rewang* preparation.

One of the major concerns when food is mass-prepared is time-temperature abuse which is the primary factor for active microbial proliferation in foods. Time abuse can either be cooking the food shorter than the required duration (depending on the volume) which leads to undercooked foods, or leaving the cooked foods for a long time at room temperature (prolonged holding time), while temperature abuse is defined as cooking the foods lower than the temperature required to kill or destroy microbial contaminants. All these can inevitably increase the risk of microbial contamination (Houška et al., 2007). Improper handling during food preparation is also one of the important factors that could lead to food contamination. Poor food hygiene practices during food preparation in the kitchen have been shown to be directly related with poor microbiological quality. Furthermore, the hygiene of the utensils or equipment that come into contact with the foods also needs to be

taken into great consideration. Utensils that are not properly cleaned can favour the growth of pathogenic bacteria (Nagla et al., 2014) which ultimately cause food poisoning. Therefore, the growth of these bacteria needs to be strictly controlled in order to prevent any foodborne outbreak.

In Malaysia at present, the microbiological quality and safety status of the foods being served, and the hygienic quality of the equipment used during wedding banquets are unfortunately scarce. The aim of the present work is therefore to identify the relationship between the microbiological quality and safety status of the foods being served during wedding banquets (prepared by catering and *rewang*) and the food safety knowledge among the selected food handlers. The specific objectives of the present work are as follows:

- 1. To investigate the microbiological quality and safety of three main dishes (*e.g.*, chicken, vegetable and cooked rice) served during Malay wedding banquets prepared by catering and *rewang* at different holding times (0, 1, 2, 3, 4 hours), and
- 2. To determine the food safety knowledge level of selected food handlers,
- 3. To establish the incidence of bacterial contamination and operational temperature during food preparation of the selected wedding banquets.

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