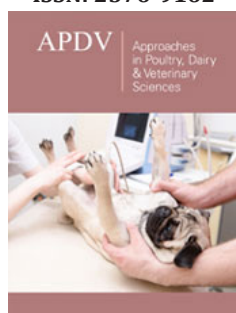


Study on the Consumers' Habits for Meat Preparation in the Light of Cancer Hazards

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Introduction

Our research was aimed at investigating the meat preparation habits, and the outcomes were compared to the WHO statement published in 2015 about the possible carcinogen effects of these foods [1]. Evidence linked the chosen cooking methods and temperatures to the formation of carcinogen compounds as polycyclic aromatic hydrocarbons or heterocyclic amines. Processed red meat in the diet was found to be connected to various health issues such as colorectal carcinoma, pancreatic cancer, renal cell carcinoma, esophageal cancer and many other diseases [1-5]. These diseases are preventable by modifying diet and lifestyle.

Heterocyclic amines form a considerable group of biologically active molecules with a wide spectrum of effects on living beings. Some of them, for example niacin is essential but there are also really harmful ones. The International Agency for Research on Cancer (IARC) classifies some of the thermic (or IQ-type) HCA's in class 2A (probable human carcinogens) or 2B (possibly human carcinogens) due to their DNA-adduct forming possibility. The formation of these compounds is attached to heat, at least 150 °C and the needed components are amino acids, reducer sugars and creatine or creatinine. Another important type of HCA's are the pyrolytic (non-IQ-type) HCA's. These are co-carcinogens, being not carcinogenic on their own but strengthening other carcinogenic agents' impact. Pyrolytic HCA's are formed during the pyrolysis of amino acids and proteins over 300 °C.

Methods

Our survey was carried out by a web-based questionnaire (n=300) observing trends in meat preparation at home among the consumers as well as consumers' knowledge regarding the risks and the adverse health effects associated with them. Age, gender and country of residency were compulsory questions. Questions relating to meat and meat products were also included along with cooking methods. The survey was posted online via Facebook and Twitter. The results of survey was analysed through MS Excel.

Results

According to our results, the most frequently consumed meats are chicken and pork. 10% of the respondents eats chicken every day, 92.6% at least once a week. 57% of them consumes pork at least once a week. Preferences towards meat products were also surveyed. One third of the respondents consumes meat products from the IARC '1' list (carcinogenic: salami, bacon etc.) at least once a week. Poultry products are tendentially more popular than pork. For example, 59% of the respondents consumes ham from poultry at least once a week opposite to the 45% for the pork ham.

Preparation mode of the meat meals has also influence on the amount of HCA's formed due to the different time and temperature parameters. The most popular meal preparation methods for these meats are frying in pan (70% of the respondents said that they use it at least 'frequently'), or in the oven (75%). Majority of the respondents chose the recipe by the meat type (80% of the respondents said that they do this at least 'frequently'), other considerations, as calorie content, general composition, or price come only after this.

Also, majority of the respondents prepare meat at medium temperature (150-170 °C) (70%), in roast pan frequently above 170 °C (54.7%). Majority of them sets the temperature

of cooking/frying only by the buttons of their oven (63.5 %), or stove (61.8%). Only a minority of them (10.3%) owns a food thermometer. Surprisingly, the low-temperature meal preparation methods proved to be also popular (46.7 % of the respondents said that they cook the meat at or below 150 °C). Cooking time is kept rather strictly, 47.6% of the respondents said that they check it frequently. Strong correlation ($r=0.7488$) was found between the commitment of respondent for keeping the preparation time and the preparation temperature. It suggests that if somebody is willing to take care of the way (s)he prepares the meal, they will consider all possible factors. On the other hand, it also suggests that people not caring the way they prepare the meal presumably tend not to deal with any of the details.

For curing, the respondents mainly use oil-based treatments, and especially chicken is cured in this way. 80% of the respondents said that they prepare chicken meat this way at least 'frequently'. The most common antioxidant containing spices are quite often used: onion, garlic, mustard, basil, rosemary are used in the marinades by more than 40% of the respondents.

Conclusion

From various scientific studies performed over many years it is clear that there is a definite connection between meal preparation methods and various illnesses in people. According to our study, poultry and pork were the two most popular meat types among the respondents, and frying was the most popular preparation method for it. Higher temperatures favouring the formation of carcinogenic HCAs are used frequently. On the other hand, preparation time is

kept rather strictly among the respondents, and use of spices is rather popular. Since these spices contain antioxidants preventing – or decreasing – the formation of HCAs, which is also dependent on the time interval of heat treatment, these two latter findings may somewhat decrease the hazards induced by the high preparation temperatures. However, deeper understanding of the chemical safety of meat-based foods from the side of consumers would be desirable in order to decrease the occurrence of meal-bound cancer cases.

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