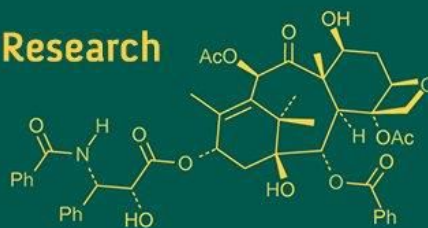
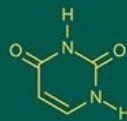
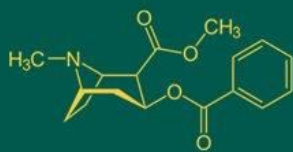


International Journal of Advanced Biochemistry Research



ISSN Print: 2617-4693
ISSN Online: 2617-4707
IJABR 2024; SP-8(8): 677-680
www.biochemjournal.com
Received: 18-06-2024
Accepted: 25-07-2024

Kavya Gupta
Division of Veterinary Public Health and Epidemiology, Faculty of Veterinary Sciences and Animal Husbandry, Sher-e-Kashmir University of Agricultural Sciences and Technology of Jammu, R. S. Pura, Jammu and Kashmir, India

Mohd Ashraf Malik
Division of Veterinary Public Health and Epidemiology, Faculty of Veterinary Sciences and Animal Husbandry, Sher-e-Kashmir University of Agricultural Sciences and Technology of Jammu, R. S. Pura, Jammu and Kashmir, India

Harsh Kumar Sharma
Division of Veterinary Public Health and Epidemiology, Faculty of Veterinary Sciences and Animal Husbandry, Sher-e-Kashmir University of Agricultural Sciences and Technology of Jammu, R. S. Pura, Jammu and Kashmir, India

Mohd Rashid
Division of Veterinary Public Health and Epidemiology, Faculty of Veterinary Sciences and Animal Husbandry, Sher-e-Kashmir University of Agricultural Sciences and Technology of Jammu, R. S. Pura, Jammu and Kashmir, India

Corresponding Author:
Kavya Gupta
Division of Veterinary Public Health and Epidemiology, Faculty of Veterinary Sciences and Animal Husbandry, Sher-e-Kashmir University of Agricultural Sciences and Technology of Jammu, R. S. Pura, Jammu and Kashmir, India

Hygienic meat production: Identifying risks at retail poultry outlets

Kavya Gupta, Mohd Ashraf Malik, Harsh Kumar Sharma and Mohd Rashid

DOI: <https://doi.org/10.33545/26174693.2024.v8.i8Sj.1897>

Abstract

The present study was conducted to assess the risk factors of meat contamination in five different districts of Jammu division namely Jammu, Udhampur, Rajouri, Kathua and Samba. A semi structured questionnaire was administered to know the risk factors of meat contamination. The butchers were randomly chosen and interviewed by visiting the retail shops/outlets. The data was analysed using Statistical Package for the Social Science (SPSS) software. Eighty percent retail outlets were found using tap water for cleaning, washing equipment and cleaning offals after the animal have been slaughtered and 52% meat handlers had not taken any training on meat hygiene practices. Most of the slaughtering facilities (84%) had problem of water stagnation, floods, smoke, dust and other contaminants.

Keywords: Chicken meat, questionnaire, risk factors, SPSS, butchers

Introduction

Chicken is a nutritious, healthy food and an excellent source of minerals and micronutrients such as iron, copper, zinc and manganese. Meat could be regarded as high-risk food owing to their abounded ingredients that could favour the microorganisms (Subratty and Gurib 2003) [6]. Chicken meat can be contaminated at several points throughout the processing operations. The contamination is also possible at any stage of the production process, from feather plucking, evisceration, and washing to storage by cooling or freezing (Mead, 1989) [4]. Microorganisms from the environment, equipment and operator's hands can contaminate meat. The possible source of contamination with microorganisms are the animal skin, surfaces in contact with meat, the clothing and the hands of personnel involved in the slaughter process. Coliform are the most frequently identified group of meat especially, *Citrobacter freundii* and *Escherichia coli*. Contamination of poultry meat with food borne pathogens remains an important as public health issue because it can lead to illness if there are malpractices in handling, cooking or post cooking storage of the product. To prevent illness or outbreak of food borne diseases, high standard of hygienic and safety practices by food handlers are essential parts of an overall food safety programmes. Personal hygiene of butchers also marks an important role in preventing the entry of food borne pathogens (Fawzi *et al.*, 2009) [2].

Materials and Methods

Study design

The present study was conducted in the five districts of J&K namely Jammu, Udhampur, Rajouri, Kathua and Samba to assess the risk factors at retail poultry outlets. The risk factors related to the hygienic meat production at the retail poultry outlets were also determined by gathering information using a semi structured questionnaire

Study area

The present study was conducted in the five districts of J&K namely Jammu, Udhampur, Rajouri, Kathua and Samba.

Sampling method and size

Butchers were randomly chosen and interviewed by visiting their retail shops/outlets. A total of 200 retail shops/outlet were surveyed.

Data collection and statistical analysis

A semi structured questionnaire was prepared and used for face-to-face interview to evaluate the awareness among butchers. Interview was conducted in local language. The questionnaire included the source of water, location of the slaughtering facilities, cleaning of equipment's, training on meat hygiene, regular medical check-up, facilities for washing hands and hygienic condition of protective equipment's like apron/white coat or head cover. Some observations were noted by observing their maintenance of hands after visiting toilets and cross contamination of meat. The data were coded, tabulated and analysed by using Statistical Package for the Social Science (SPSS) software.

Results

Among the 200 retail outlets across five districts, 160 (80%) relied on tap water as their primary source for cleaning, washing equipment, and cleaning offals after slaughtering animals. In Jammu district, 87% of outlets used tap water as their main source, followed by Rajouri at 85% and Samba at 80%. Groundwater was used by none of the outlets except in

Udhampur, where 10% of them relied on it (Table and Fig. 1). Over 70% of slaughtering facilities across all districts experienced issues such as water stagnation, floods, smoke, dust, and other contaminants. Most facilities lacked provisions for washing dirty animals before slaughter. Majority of the slaughtering premises had no provision of washing dirty animals before slaughtering. In Rajouri district, 92.5% of retail outlets reported that their equipment was cleaned before each slaughtering operation, with Jammu at 92.7% and Udhampur at 85. Handlers generally practiced good hygiene, maintaining or washing their hands after using the toilet or before starting work, ranging from 95.38% to 100% across all districts. In Udhampur, 67% of meat handlers had received training in basic meat hygiene practices, followed by Kathua at 51.4%. More than half of the slaughter facility staff underwent regular medical checkups, with the highest percentage in Jammu (70.7%) and the lowest in Udhampur (52.5%). Rajouri had the highest proportion of retail outlets with sinks for handwashing (87.5%), followed by Udhampur (65%) and Jammu (55.38%). Most butchers thoroughly washed carcasses that came into contact with faeces and intestinal contents. However, the hygiene of aprons, white coats, and head covers among meat handlers was found to be very poor across all districts studied (Table and Fig. 2.).

Table 1: Response of meat handlers towards risk factor (different source of water for cleaning and washing of equipment's) of meat contamination

Question Statement	Districts					
1.Source of water	Jammu (n=65)	Udhampur (n=40)	Rajouri (n=40)	Kathua (n=35)	Samba (n=20)	Total n (%)
i. Tap water	57(87.0)	29(72.5)	34(85.0)	24(68.5)	16(80.0)	160(80.0)
ii. Ground water	0(0.0)	4(10.0)	1(2.5)	0(0.0)	0(0.0)	5(2.5)
iii. Others	8(12.3))	7(17.5)	5(12.5)	11(31.4)	4(20.0)	35(17.5)

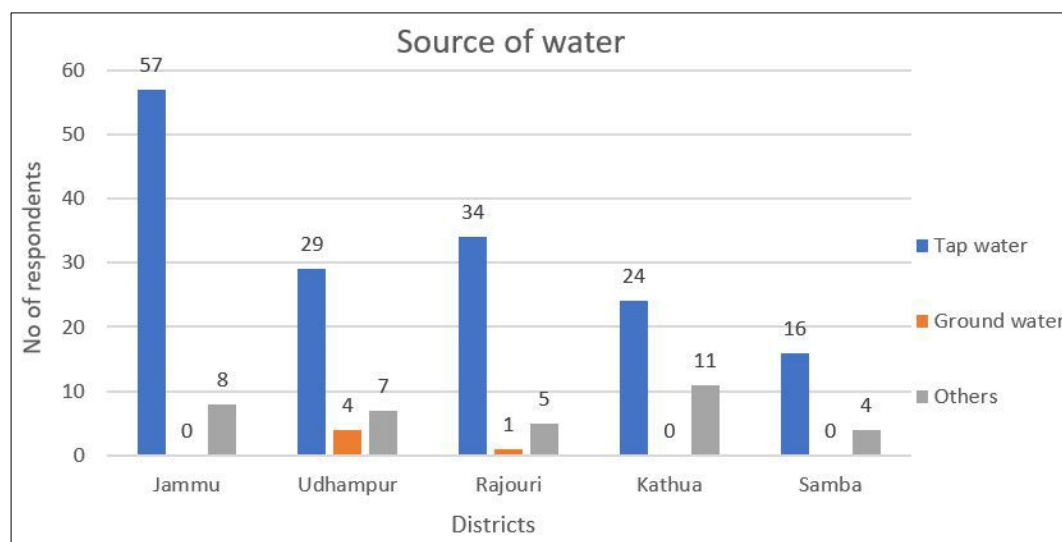


Fig 1: Response of meat handlers towards risk factor (different source of water for cleaning and washing of equipment's) of meat contamination

Table 2: Response of meat handlers towards associated risk factors of meat contamination

Question statements	Positive response no (%)						Negative response no (%)					
	Jammu (n=65)	Udhampur (n=40)	Rajouri (n=40)	Kathua (n=35)	Samba (n=20)	Mean	Jammu (n=65)	Udhampur (n=40)	Rajouri (n=40)	Kathua (n=35)	Samba (n=20)	Mean
1. Is the location of the slaughter facility subject to water stagnation, floods, objectionable odours, smoke, dust or other contaminants?	56(86.1)	28(70)	34(85.0)	33(94.2)	17(85.0)	84.0	9(13.8)	12(30.0)	6(15.0)	2(5.7)	3(15.0)	16.0
2. Is there a provision of washing dirty animals presented for slaughter before slaughter?	30(46.15)	10(25.0)	15(37.50)	5(14.28)	6(30.0)	33.0	35(53.85)	30(75.0)	25(62.50)	30(85.71)	14(70.0)	67.0
3. Do you ensure that all the equipments are clean before start of slaughter operations?	59(90.77)	34(85.0)	37(92.50)	19(54.28)	13(65.0)	81.0	6(9.0)	6(15.0)	3(7.5)	16(45.71)	7(35.0)	19.0
4. How do you maintain your hands clean after visiting toilet or before start of work?	62(95.38)	38(95.0)	38(95.0)	35(100.0)	20(100.0)	96.5	3(4.61)	2(5.0)	2(5.0)	0(0.0)	0(0.0)	3.5
5. Have slaughter facility personnel undergone any training on minimum meat hygiene handling practices?	27(41.5)	27(67.5)	17(42.5)	18(51.4)	7(35.0)	48.0	38(58.4)	13(32.5)	23(57.5)	17(48.5)	13(65.0)	52.0
6. Do slaughter facility personnel undergo a regular medical check-up every year?	46(70.7)	21(52.5)	27(67.5)	22(62.8)	12(60.0)	64.0	19(29.2)	19(47.5)	13(32.5)	13(37.1)	8(40.0)	36.0
7. Do you have sink for washing hands?	36(55.38)	26(65.0)	35(87.50)	12(34.28)	10(50.0)	50.0	29(44.61)	14(35.0)	5(12.50)	23(65.71)	10(50.0)	40.5
8. What do you do when carcass meat comes in contact with faeces or intestinal contents?	51(78.46)	33(78.57)	35(87.50)	23(65.71)	11(55.0)	55.0	14(21.53)	7(17.50)	5(12.50)	12(34.28)	9(45.0)	23.5
9. What is the hygienic condition of apron/white coat or head cover?	0(0.0)	0(0.0)	0(0.0)	1(2.86)	0(0.0)	0.5	65(100.0)	40(100.0)	40(100.0)	34(97.14)	20(100.0)	99.5

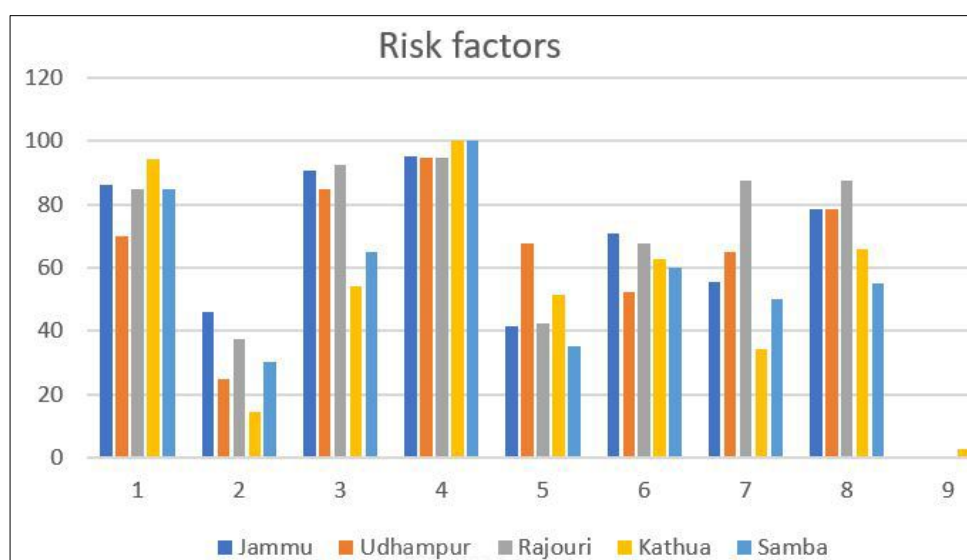


Fig 2: 1. Is the location of the slaughter facility subject to water stagnation, floods, objectionable odours, smoke, dust or other contaminants?, 2. Is there a provision of washing dirty animals presented for slaughter before slaughter?, 3. Do you ensure that all the equipments are clean before start of slaughter operations?, 4. How do you maintain your hands clean after visiting toilet or before start of work?, 5. Have slaughter facility personnel undergone any training on minimum meat hygiene handling practices?, 6. Do slaughter facility personnel undergo a regular medical check-up every year?, 7. Do you have sink for washing hands?, 8. What do you do when carcass meat comes in contact with faeces or intestinal contents? and 9. What is the hygienic condition of apron/white coat or head cover?

Discussion

In the present study, majority of the meat handlers of all the districts were found using tap water for cleaning and washing of equipments. It was observed that 85% of meat handlers did not wear any protective clothing. This is an agreement with the study conducted by Gurmu *et al.*, (2013)^[3] where none of the studied meat handlers put on hair cover. Similarly, a study in Nairobi Isiolo revealed that about 82% of slaughtering workers lacked protective clothing (Chepkemai *et al.*, 2015; Taggar and Ahmed, 2021)^[1, 7]. Most meat handlers (96.5%) practiced handwashing after using the toilet, consistent with results reported by Yenealem *et al.* (2020)^[8]. The study also found that 52% of meat handlers had not received training in meat hygiene practices. Additionally, 84% of slaughtering facilities faced issues such as water stagnation, floods, smoke, dust, and other contaminants. Roberts and de Jager (2004)^[5] highlighted that abattoirs are a major source of foodborne diseases and health hazards if food hygiene principles are not followed. This fact is supported by the results of the present finding that there is a gap in the awareness in abattoir and butchers shop workers on meat handling and maintain hygienic status in their working area.

Conclusion

The exposure of meat to the unhygienic practices from the point of production to retail level increases the level of microbial contamination in the produce. In order to reduce the microbial load on meat, carcasses sold in different districts, standard operating methods should be practised. Such methods include proper inspection, regular supervision or monitoring of hygienic practices on regular interval, screening of meat handlers and all the people involved in handling of meat. It is, therefore, suggested to create awareness about the raw meat handling with appropriate hygienic measures and importance of continuous microbial monitoring to safeguard the wholesomeness of meat and thus protecting health of consumers.

Acknowledgement

The author thankfully acknowledges the help received from the Dean F.V.Sc & A.H, SKUAST-Jammu and staff members of the Division of Veterinary Public Health and Epidemiology.

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