

Assessment of Knowledge and Practices of Hygienic Milk Production among Dairy Farmworkers, Southwest Delhi

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Abstract

Introduction: India has emerged as the highest milk-producing country in the world, with an annual production of 137.7 million tones (2013–2014). The quality of contaminated milk deteriorates quickly and produces diseases if consumed. Therefore, care has to be taken in production, storage, and transport of milk. Knowledge about hygienic milk production practices is essential for proper health and nutrition. However, an assessment of their knowledge of hygienic milk production practices has not been carried out in a systematic manner. **Objective:** This study aims at assessing the knowledge and practices of hygienic milk production among small dairy farmers in the peri-urban area of Southwest Delhi. **Methodology:** This exploratory cross-sectional study is conducted among 60 dairy farmworkers, selected conveniently from Southwest Delhi. Practices and knowledge levels are assessed using a pretested semi-structured questionnaire. **Results:** The desired outcome indicates the knowledge level of dairy farmworkers regarding clean milk production practices. **Conclusion:** Knowledge level -It can be observed that 66.6% of the dairy farmworkers belong to category 2 (medium), whereas 13.3% and 20% of dairy farmworkers belong to category 1 (low) and 3 (high), respectively. Practice level -This study indicates that 60% of the dairy farmworkers belong to category 2 (medium), followed by 21.6% and 18.3% of the dairy farmworkers belong to category 1 (low) and 3 (high), respectively.

Keywords: Clean milk production, dairy, dairy farming, farmworkers, zoonosis

INTRODUCTION

Milk is the main product of the dairy farm industry, produced mainly for human consumption. A dairy farmer tries to maximize milk output from his/her dairy herd. At the same time, farmers must ensure hygienic conditions of milking so that milk can be made fit for consumption. In the absence of proper milking practices, milk can act as a medium of spreading bacteria and other microorganisms. As such, disease hazards in public can easily be predisposed by infected milk during production, handling, and marketing. Milk, if it is not fit for human use is a financial loss to the producing farmer.

Clean milk can be defined as milk produced from healthy animal possessing normal flavor, devoid of dirt, and filth containing permissible limit of bacteria, and essentially free from adulterants, pathogens, various toxins, abnormal residues, pollutants, and metabolites.^[1] Contaminated milk deteriorates quickly and is a cause for health concerns. One of the major causes of illness in various countries is the transmission of diseases through food. Zoonosis is diseases and infections that are naturally transmitted between vertebrate

animals and humans. Zoonosis constitutes 61% of all known infectious diseases. It may also be noted that of the 175 diseases considered to be emerging, 75% are zoonotic.^[2] Poor hygiene, poverty, malnutrition, lack of education, and close contact with animals are predisposing factors for zoonotic diseases. There are some 45 zoonotic diseases purported to be transmitted from cattle. Dairy farmers, who are in close contact with their animals, are always at risk of acquiring infections from animals. The maintenance of healthy milking animals reduces the likelihood that human pathogens are introduced into the milk through the mammary gland or from the feces.^[3]

Some of the zoonotic diseases that spread through milk are Brucellosis, Tuberculosis, Salmonellosis, etc., The prevention

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of tuberculosis is by avoiding unpasteurized dairy products. People get infected Salmonella from half-cooked contaminated meat, infected eggs, or unpasteurized milk products. In the absence of proper handwash after direct contact with infected feces, accidental ingestion of bacteria can also occur.^[4]

The clean milk production (CMP) involves cleanliness at different phases of handling animals, processing, and transporting of milk and milk products. Stringent quality control and hygienic measures are required at a dairy farm level to maintain the milk quality. The milk quality is determined by aspects of composition and hygiene of milk.

There are mainly four factors to be considered in CMP practices: Animal hygiene, milking hygiene, equipment hygiene, and processing hygiene.^[1]

Objective

The objective was to assess awareness, knowledge, and practices of dairy farmers regarding hygienic milk production practices at the dairy farm level and to explore factors associated with it.

METHODOLOGY

Study setting

The present study was conducted in Najafgarh Tehsil, a typical peri-urban area in Southwest Delhi with concentrated dairy farming villages. Nangli dairy in Najafgarh has many milk-producing dairy farms and households. These facilities are chosen based on their suitability to the purpose of the study.

Southwest Delhi is one of the eleven administrative districts of the National Capital Territory of Delhi in India. The Subcity of Dwarka serves as the administrative headquarters of Southwest Delhi. The Southwest Delhi is comprised urban and peri-urban areas with a population of 2,292,363 (census 2011), literacy rate 88.81%, population density 5445 and covers an area of 421 km².

Study population

Dairy farmworkers those were directly involved in milking and handling of milk and milk products. Dairy farmworkers are the first point of contact with milk production, their knowledge is essential for hygienic production of milk. Adults above the age of 18 years were chosen for the study.

Study design

The descriptive cross-sectional study measures the prevalence of health condition and outcome at on particular point of time in a defined population.^[5] This design is used in this study to assess the sample of dairy farmworkers at one specific point of time. It is helpful in understanding the present knowledge of farmworkers in regard to hygienic milk production and provides a snapshot of the frequency and characteristics of the given condition. These studies can usually be conducted relatively faster and are inexpensive. The participants are selected based on their working profile. They are dairy farmworkers involved in handling and milking the cattle.

Sampling

Convenient sampling was used to select the respondents under this study.

Sample size

The sample size consisted of 60 adult dairy farmworkers. The sample was chosen based on convenience and accessibility. Thirty dairy farms were selected for the study. The researcher visited 30 dairy farms in Najafgarh district. Maximum three dairy farmworkers have been selected from each farm, who were mainly involved in milking and handling of cattle. He/she was asked questions from a pretested and piloted semi-structured questionnaire. The information on hygienic practices was extracted from these answers, tabulated and analyzed and presented in the report in a tabular format.

Data collection tool

Data were collected with the help of a questionnaire. The questionnaire was comprised of various sections with questions related to animal hygiene, milking hygiene, equipment hygiene, and processing hygiene. Socioeconomic status was assessed using a modified Kuppuswamy scale.

The sections and questions were selected with close consultation with subject matter experts and from the available review of literature covering the basic points of CMP practices as detailed in standard operating procedures (SOPs) by the National Dairy Development Board (NDDB).

The semi-structured questionnaire was developed initially in English and translated into Hindi and retranslated back to ensure meaningful context and reliability.

The items for this test were selected with the consultation of subject matter specialists, reviewing literature, and previous research studies. Some were based on guidelines and SOP for CMP practices (given by NDDB).

Scoring

Here, we are testing basic knowledge and practices of workers regarding CMP. To quantify the response for every correct or ideal answer participant is given mark 1. Multiple choice questions having more than one correct answer are marked according to the degree of correctness. Responses for each knowledge and practice questions are then added to find total knowledge and practice score, respectively.

Ethical considerations

The study was reviewed and approved by the ethics committee of the International Institute of Health Management Research, Delhi. Confidentiality, voluntary participation, benefits, right to leave anytime during the study and importance of the responses were conveyed to the participants. Written consent form was assigned before start of the study.

RESULTS

Overall knowledge and practices regarding clean milk production practices

Sufficient awareness is important for dairy farmworkers for

successful and profitable dairy farming. The data regarding the level of knowledge are given in Table 1. It can be observed that 66.6% of the dairy farmworkers belong to category 2 (medium), whereas 13.3% and 20% of dairy farmworkers belong to category 1 (low) and 3 (high), respectively. This study indicates that 60% of the dairy farmworkers belong to category 2 (medium), followed by 21.6% and 18.3% of the dairy farmworkers belong to category 1 (low) and 3 (high), respectively.

Independent variables and adoption level of dairy farmworkers toward clean milk production practices

The effects of age, socioeconomic status, and experience on adoption level toward CMP are given in Table 2. From the data, it revealed that socioeconomic status has a significant relationship on practices adopted by farmworkers, whereas other factors such as age and experience do not show significant relationships. This is probably because there are a number of other factors which need to be explored that could have influence on CMP practices.

Independent variables and knowledge level of dairy farmworkers toward clean milk production practices

The effects of age, socioeconomic status, and experience on knowledge level and awareness of farmers toward CMP are given in Table 3 – the data revealed that age, education, and socioeconomic status does not affect the knowledge level and awareness of farmers toward CMP practices as mean correct responses difference among different age, socioeconomic groups remained statistically nonsignificant.

DISCUSSION

General background

The Nangla dairy farms are located in Najafgarh, peri-urban area in Southwest district. In 1978, when the development of important areas in Delhi started, all dairies were shifted to the outskirts of the city. Situated few kilometers away from the posh area of Dwarka, people here are struggling with basic electricity and water. About 55.6% of dairy farmworkers reported unavailability of clean water. Dairy farming is a major profession there. The study reported 100% milking practice by hands.

Profile

Table 4 depicts the profile of dairy farmworkers. Most of the dairy farmworkers are adults with 54.7% belong to the age group of 18–35 years. This is probably because farming activity requires vigorous manual work. Dairy farmworkers reported a mean of 16 years of dairy farming experience, with a minimum of 2 years and a maximum of 40 years of experience. Around 42.2% of dairy farmworkers belong to the upper-lower socioeconomic group according to the scale developed by Kuppaswamy. About 72.2% of dairy farms under the study possess lactating cattle <30, while 22.7% possess ≥30. Average milk production is 135 kg/day, while 72.2% of farms produce <150 kg/day milk.

Table 1: Knowledge and practice level of dairy farmers toward hygienic milk practices

| Particulars | Standard deviation interval | Category | Frequency (%) |
|----------------------------|-----------------------------|------------|---------------|
| Knowledge on CMP practices | <4 | Category 1 | 8 (13.3) |
| | 4-7.5 | Category 2 | 40 (66.6) |
| | >7.5 | Category 3 | 12 (20) |
| Practice of CMP practices | <8.4 | Category 1 | 11 (18.3) |
| | Between 8.4 and 13.8 | Category 2 | 35 (60) |
| | Above 13.8 | Category 3 | 13 (21.6) |

SD: Standard deviation, CMP: Clean milk production

Table 2: Association between characteristics of dairy farmers and practice level

| Variables | P | Significance |
|----------------------|-------|--------------|
| Socioeconomic status | 0.000 | S |
| Age | 0.616 | NS |
| Experience | 0.732 | NS |

NS: Nonsignificant, S: Significance of values at $P=0.05$

Table 3: Association between characteristics of dairy farmers and knowledge level

| Variables | P | Significance |
|----------------------|-------|--------------|
| Socioeconomic status | 0.076 | NS |
| Age | 0.418 | NS |
| Experience | 0.683 | NS |

NS: Nonsignificant

Table 4: Profile of dairy farmworkers

| Particulars | Range | Frequency (%) |
|--|------------------------------|---------------|
| Age | Adults (18-35) | 29 (54.7) |
| | Middle-aged adults (36-55) | 20 (37.7) |
| | Older adults (55 and above) | 4 (7.5) |
| Education of the head of the family | Unemployed | 2 (3.3) |
| | Skilled worker | 4 (6.7) |
| | Clerical, shopkeeper, farmer | 54 (90) |
| Experience | 1-10 | 22 (38.6) |
| | 20-30 | 21 (36.8) |
| | 30-40 | 12 (21.1) |
| | 40-50 | 2 (3.5) |
| Socioeconomic status | LM | 17 (27.9) |
| | UL | 26 (42.6) |
| | UM | 17 (27.9) |
| Daily average milk production (kg/day) | <150 | 42 (72.2) |
| | >150 | 15 (27.7) |
| Lactating cattle number | <30 | 42 (72.2) |
| | >30 | 15 (27.7) |

LM: Lower middle, UL: Upper lower, UM: Upper middle

Knowledge and practices of clean milk production followed by the dairy farmers are shown in Tables 5 and 6, respectively.

Animal hygiene

The current study shows farmworkers follow practices such

Table 5: Knowledge of farmworkers regarding hygienic milk production practices

| Parameter | Frequency (percentage of workers following ideal practice) |
|---|--|
| Pasteurization of milk before consuming | |
| Pasteurized | 38 (63.3) |
| Importance of handwashing | |
| Yes | 46 (76.6) |
| Wash hands before milking | |
| Yes | 45 (73.7) |
| Wash hands after milking | |
| Yes | 42 (70) |
| Usage of soap | |
| Yes | 36 (60) |
| Usage of towel | |
| Yes | 35 (57.4) |
| Importance of clean clothes | |
| Yes | 19 (31.7) |
| Tobacco use prevention | |
| Yes | 31 (47.5) |
| Disposal of dung | |
| Drain | 26 (41.6) |
| Used | 15 (24.6) |
| Worker picks away for disposal | 7 (11.5) |

as periodic examination with doctor (58.3%). There is low practice (i.e., <50%) of few activities such as isolation of cattle from the diseased ones (46.6%) and vaccination of cattle (45%).

Another study on the adoption of quality milk production, Wardha district of Maharashtra, stated slightly better adoption practices. About 68% of farmworkers vaccinate milking animals regularly (partial adoption) and around 95% of workers wash utensils with water or caustic soda. Around 67% (partial adoptions) of farmworkers follow a regular examination of milking animals by veterinary doctors.^[6]

Environment hygiene

Most of the cattle dung disposed in the running drain (41.6%), while (24.6%) few used it for household and other purposes.

Equipment and milking hygiene

Cleaning of utensil is the major part of CMP practices, where utensil is prone to aspects related to milk quality deterioration. A critical perusal of the data furnished portrays that farmworkers follow few practices (i.e., more than 50%) such as filtration of milk (86.6%), covering utensil with lid (95%), cleaning of utensils with water (76.6%), and 18.3% use detergents for washing utensils. Few of the farmworkers use a teat dip solution (6.6%). This is contradictory to a study in Kerala, where there high usage, around 87% of workers use detergents for washing utensils, but nobody was aware of any teat dip solution like iodophores. Another study on the adoption of quality milk production, Wardha district of Maharashtra stated that around 95% of workers wash utensils with water or caustic soda.

Table 6: Hygienic milk production practices followed by farmworkers

| Parameter | Frequency (percentage of workers following ideal practice) |
|--|--|
| Isolation of cattle when sick | |
| Yes | 32 (46.7) |
| Periodic health checkup | |
| Yes checkup | 35 (58.3) |
| Sometimes when sick | 16 (26.2) |
| Periodic checkup by whom | |
| Doctor | 39 (65) |
| Self | 8 (13.3) |
| Both doctor and self | 6 (10) |
| Vaccination of cattle | |
| Yes | 27 (45) |
| Udder management | |
| Full practice | 29 (49.9) |
| Partial practice | 11 (18.6) |
| Teat milk solution used | |
| Water | 40 (66.7) |
| Detergent or soap | 4 (6.7) |
| Potash or other medicinal solution | 4 (6.7) |
| Solution for cleaning of utensils | |
| Water | 46 (76.6) |
| Detergent or soap water | 11 (18.3) |
| Other disinfectants like potash | 3 (5) |
| Availability of lid | |
| Yes | 57 (95) |
| Work when sick | |
| No | 27 (45) |
| Filtration of milk | |
| Yes | 52 (86.6) |
| Solution used cleaning floor | |
| Water | 46 (76.6) |
| Detergent or soap solution | 11 (18.3) |
| Dettol or phenyl water | 3 (5) |
| Any wounds on injury on hands of workers | |
| No | 37 (61.7) |
| Cleaning of farm area | |
| Once or twice | 36 (60) |
| Three or four times | 24 (40) |

Personal hygiene

This study reveals that dairy farmers have satisfactory knowledge on few aspects of CMP such as importance of handwashing (76.6%) and both pre- (76.6%) and post-handwashing (70%). There are <50% have knowledge of these activities – importance of clean clothes and tobacco usage prevention. The health of the farmworkers is neglected. Fifty-five percent of workers work even when they are sick. There is a dependence of farmworkers on tobacco products in Nangla dairy, Najafgarh. The findings of another study in Kerala showed only 20% of farmworkers ensure personal hygiene.

Overall knowledge

It reveals that 66.6% of the dairy farmworkers belong to category 2 (medium), while 13.3% and 20% of dairy farmworkers belong to category 1 (low) and 3 (high), respectively.

Overall practice of clean milk production practices followed by dairy farmworkers

From the study, it indicates that 60% of the dairy farmworkers belong to category 2 (medium), followed by 21.6% and 18.3% of the dairy farmworkers belong to category 1 (low) and 3 (high), respectively.

A similar study conducted in the state of Rajasthan revealed that 55.84% of the dairy farmers had a medium level of knowledge in various aspects of CMP, followed by 33% and 20% of them having low and high level of knowledge, respectively.

Effect of variables

The current study reveals that variables age, experience, and socioeconomic status hold an insignificant relationship with the knowledge level of dairy farmers. Socioeconomic status has a significant relationship on practices adopted by farmworkers, whereas other factors such as age and experience do not show significant relationships.

Another study on practice-wise knowledge and adoption of CMP by dairy farm women in Junagadh district reported a positive relationship of variable experience on knowledge and practice adopted by farmworkers, whereas age has a nonsignificant correlation with the adoption of CMP practices of dairy farm women.^[7]

CONCLUSION

Milk is an essential commodity, which is consumed by large number of consumers. Maintaining quality is important for both health and financial perspectives. Dairy farmers' knowledge from the study is inferior in a few factors such as personal hygiene of workers in wearing clean clothes and prevention of tobacco use. There is satisfactory knowledge (more than 50%) on hand hygiene, both pre- and post-milk handwashing, usage of soap and towel.

Critical perusal of the data furnished portrays that farmworkers follow few practices such as filtration of milk, covering utensils with lid, cleaning of utensils, and periodic examination with

doctor. There is low practice of few activities such as isolation of cattle from the diseased ones, vaccination of cattle, washing of floor with detergents, and teat washing with teat solution.

The knowledge of farmworkers is adequate in few areas, while it lacks in few areas of hygienic milk production. However, it is essential to form minimum guidelines that should reach the ground level workers with proper enforcement of such rules. Public health officials should educate them and also regularly monitor their practices to maintain the quality of milk. Small initiatives in this regard can protect the society by consuming milk from various zoonotic diseases and health issues.

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Conflicts of interest

There are no conflicts of interest.

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