Development of Training Module on GMP and GHP for Associates in Large Scale Biscuit and Cake Manufacturing Unit: A Scientific Approach

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ABSTRACT

Background: The working personnel engaged in a food manufacturing Industry in India seldom have detailed knowledge of GMP and GHP and its impact on consumers. They suffer from lack of training on GMP and GHP. The present Study aims at first on understanding the knowledge of workers on GMP, GHP and specific training need of workers working in a large scale Biscuit and cake manufacturing unit and also understanding duration and procedure of training for optimal output.

Methods: A survey among workers was conducted to assess knowledge of associates and their training need.

Result: From the survey data it appears that factory workers are not confident about their knowledge about GMP and GHP and they would very much appreciate undertaking training in GMP and GHP in short duration. Then based on outcome of the survey detailed training program module was worked out keeping in mind need of workers and various guidelines in vogue in India. Along with conventional training, short duration training with pictures, demonstration was also planned in details. Total 7 training modules with maximum total duration of 1 hr 15 min and minimum total duration of 15 mins ware worked out.

Key words: Food safety, GHP, GMP, HACCP, Quality control, Training module.

INTRODUCTION

The challenge of preparing quality safe food begins with well trained and knowledgeable work force. As per WHO (paper on food safety, 4/10/2024) an estimated 600 million - almost 1 in 10 people in the world - fall ill after eating contaminated food and 420000 die every year. US$ 110 billion is lost each year in productivity and medical expenses resulting from unsafe food in low- and middle-income countries.While most food born diseases are sporadic and often not reported, outbreaks of food borne disease may take one massive proportions. Food contaminations problems may assume significant proportion in large scale food processing Industry when food is manufactured in bulk quantity. This is also important for the reputation of the brand and its overall business performance. A preventive approach to food safety includes GMP and GHP which ensure that the manufacturers examines every stage of the process, identify the essential ways to control the food safety hazards and makes sure that the process parameters/control measures remain consistent and effective and the final food product is safe and suitable for human consumption. Each firm including biscuit and cake manufacturing unit must develop procedures to ensure that an effective food safety program has been implemented and that adequate supervision and monitoring and training systems are in place to ensure quality of food.

What is GMP/GHP training

Food safety training is a professional training program for employees and supervisors to create awareness about GMP, GHP as well as food safety and hygiene standards.

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Who should be trained

Different types of training are needed for individuals with different roles and responsibilities. Managers, supervisors, quality control staff and others with overall responsibilities for developing and implementing effective procedures to meet GMP requirements should understand or be aware of all of the GMP requirements and appropriate strategies to meet them. These individuals are likely to need more comprehensive training than production or other working personnel assigned to tasks. In this training, participants are trained on food safety rules, regulations and policies. The idea is to maintain safety standards through quality control measures.

Benefit of training

There are several reasons why it is important to train staff in GMP, GHP practices:

1. The workers are the ones actually handling food. It is important that they do so in a safe manner.
2. Reduce the risk of food poisoning.
3. Training helps with quality control. GMP,GHP is a huge part of quality control when staffs are properly trained.
4. Training helps regulate food production waste.
5. Behavior will change.
6. Employees can gain a better appreciation for their jobs.
7. Build up reputation and brand value of the Company. (Gaungoo *et al.,* 2013).

Effectiveness of training

In a study by Murlidhar Meghwal, Uday Heddur Shetti and Ravikumar Biradar as published in Chapter 1002 P22 Revised by Goyal 14 Jan 2016 in 'Good manufacturing practices for food processing industries: purposes, principles and practical applications' it was observed that the quality of food processing trainings was found very effective by most of the trainees as 88.8% graded it in very good category. Participants felt that their level of confidence and work efficiency had enhanced during the training.

Some authors including Bryan *et al.* (1992); Osimani *et al.* (2011), have reported positive association of training protocols with good hygiene practices of trainees, others including Egan *et al.* (2007); Lilian Soares *et al.* (2012), have reported otherwise. Krishnasree *et al,* 2018, also reported that even though majority of food handlers were aware of the safe food handling practice it was not followed appropriately during food preparation. Some of the factors blamed for lack of success in hygiene training were methods used, demographics of trainees and their preparedness to learn, lack of supervision after training, absence of refresher programmes (Gilling *et al*., 2001). Adolf and Azis (2012); Feglo and Sakyi (2012), equally highlighted the importance of hygiene training in the food industry.

Effective food safety training involves two stages. Firstly, it provides knowledge in a way that develops a positive attitude. The second stage involves the implementation of the knowledge properly when required. Practice, motivation and effective supervision, especially coaching, should result in the objective being achieved, *i.e.* the competency of the food handler and implementation of good practice at all times (Sprenger, 2009).

MATERIALS AND METHODS

Methodology of the study hereby clarifies the area selected for the study, time period of study and total number of samples under study.

Selection of area of study and place

The survey was conducted among the personnel working in the biscuit factories in Bhubaneswar, Odisha by using a questionnaire for general associates and specialized personnel (Quality/production) to find out extent of knowledge of GMP, GHP. This will inturn help to assess training need in terms of duration and frequency of training as per prevalent practice in the factory. Name of the Institute is West Bengal University of Animal andFisheries Science being study center for IGNOU.

Time period of study/year of experiment

One light duty hour over a period of four weeks of January 2024 was selected.

Population and sample size

As all spectrums of workers of large scale biscuit and cake manufacturing factory was chosen for study the sample size is of 70 associates divided into two groups, 58 general associates and 12 specialized associates.

Limitation of Research

- The present study focuses only to workers employed in Biscuit and Cake manufacturing Industry of Bhubaneswar, (Odisha) locality conducted in early 2024.
- The present study focuses only on self-help skills which can be done by workers themselves without any further change in factory set-up or mechanization.
- Sample size is limited to 70 in total only, which is only representative.

RESULTS AND DISCUSSION

Outcome of the survey

Lack of knowledge of Good Manufacturing Practice (GMP) as well as Good Hygiene Practice (GHP) among associates is quite clear from the survey data (Fig 1-3). Data reveals that only 57% shave regularly (Fig 1). 16% does not know how to wear head cap properly, 98% do not know colour coding of products (Fig 1). However, strict restriction is present against wearing ornaments, which is rigorously followed (100% as in Fig 1). Again 95% do not follow proper hand washing technique and even 92% do not wash hand before entering into manufacturing area (Fig 2). However 61% of the associates use washed and clean cloth regularly (Fig 2). Almost 62% rated that they have some knowledge about GMP,GHP and 80% feels that floor in the manufacturing area should be cleaned everyday and rest 20% feels that it may be cleaned in alternate days (Fig 3). 23% of the associated use cleaned apron daily (Fig 3). Fig 4 shows that 98% of associates working in the biscuit and cake manufacturing factory showed interest in further training in GMP, GHP and 93% feel that future training will improve their performance. 87% of associates prefer short duration training and 83% prefer training with demonstration and picture aid. (Fig 4) Generally most of the training in the factory is of the duration of 10-20 minutes as well as 20-30 minutes (Fig 5).

Findings of the survey are presented graphically hereunder

Training need assessment

Need analysis begins with problem identification. It is believed that a main step in any training programme is to determine whether training is needed and if so, to specify what that training should provide (Hosure *et al.,* 2020).

From the survey data it is clear that 93% of associates feel that future training will improve their performance (Fig 4). As evident from the outcome of the survey that only 61% of the factory workers use washed and cleaned cloths daily (Fig 2) and only 23% use clean apron after washing it daily (Fig 3). 92% personnel do not wash their hand every time before entering into the manufacturing area (Fig 2). 16% does not know how to wear head cap property (Fig 1). Thus there is a serious lack of understanding of personal hygiene among workers. In the own admission of the workers about 62% workers has some knowledge about GMP, GHP (Fig 3). Thus personal Hygiene would be of primary part of training. Deficiencies in knowledge is observed in survey about colour coding for easy identification of product (98% are

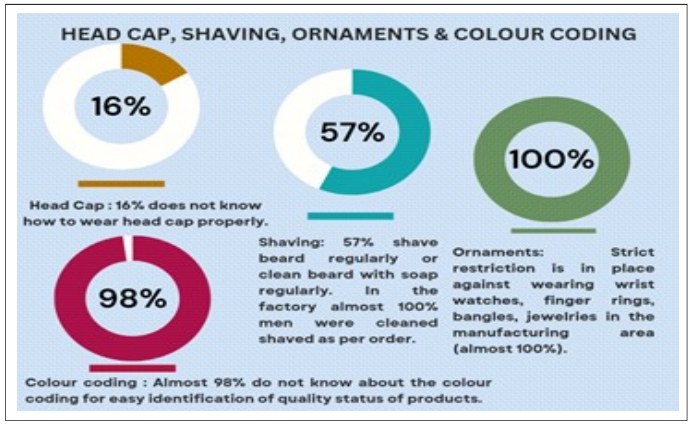


Fig 1: Factory workers outfit.



Fig 2: Cleanliness.

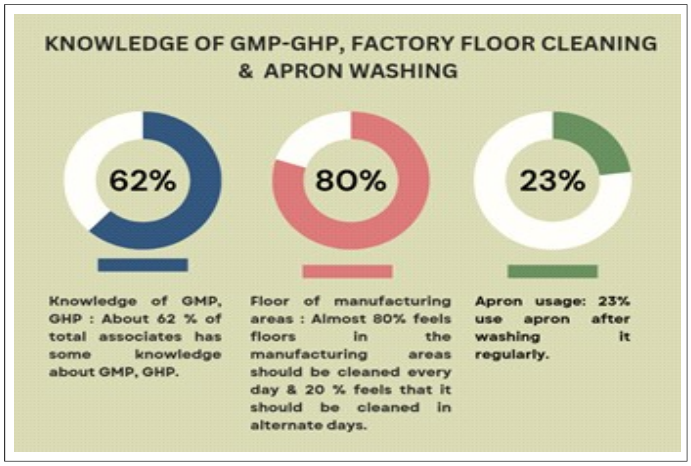


Fig 3: GMP-GHP.

not aware about it , Fig 1) and proper hand washing (Fig 2), so these are included in training. To make the training outcome better, training for short duration (as per practice of factory shown in Fig 5 and preference of 87% of associates for short training shown in Fig 4) with demonstration and picture aid may be incorporated (83% prefer for it as in Fig 4). Further, workers should also understand basic of operations, ingredients and underlying principles (Kaur *et al.*, 2019) in biscuit and cake manufacturing as without this knowledge they would not understand principles underlying GMP, GHP and feel confident in their working sphere. They should also know ideal working conditions governing GMP /GHP and what are GMP, GHP requirements in a factory. The training should also guide them the way forward and for new idea.

Training module in GMP, GHP for biscuit and cake manufacturing unit

Based on detailed study and after assessing Structure of the organisation and label of understanding of GMP, GHP in workers of the factory following 7 (seven) training modules for workers on GMP and GHP in bakery industry were developed. Maximum total duration of training of 1 hr 15 min and minimum total duration of 15 minutes training were worked out. But per day maximum duration was kept at 30 minutes based on survey outcome. Details are presented in below table-

Module no.	Code	Module title	Total duration
01	IND-01	Induction training on basic manufacturing and GMP, to newly recruited workers like operator, Sr operator and other skilled workers working in production line and refresher's training for existing workers.	GHP 1 hours (3 days, 20 min /1d)
02	SDT-01	Basics of baking, quality, standards and GMP, GMP for quality / production personnel - refresher course.	1 hr. 15 min in 3 days (25 m/1d)
03	GMP-01	Good hygiene and Good Manufacturing practice in biscuit Plant for quality / Production executives/ Lab chemist/ Microbiologist.	1 hr. in 2 days (30 min/ day)
04	GMP-02	Good hygiene and good manufacturing practice in biscuit Plant for general workers	1 hr. 15 min in 3 days, 25 min/day
05	GMP-03	Some special hand washing rules as part of GHP for food handlers.	15 min in 1 day
06	GMP-04	Demonstration of colour coding of material, crates, Do's and Don'ts in manufacturing area relating to GMP, GHP for food workers with the help of picture.	15 min in 1 day
07	GMP-05	Understanding and following of checklists as part of GMP, GHP procedure for workers as quality and Production personnel.	1 hr. for 4 days (15 min/day)

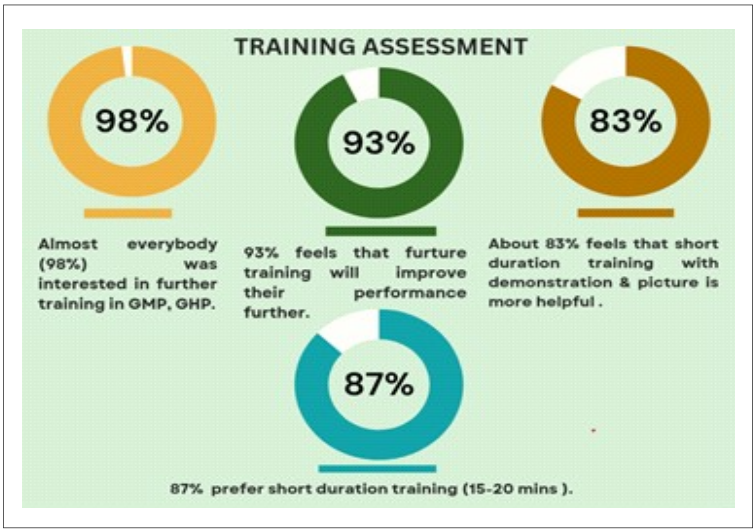


Fig 4: Training assay.

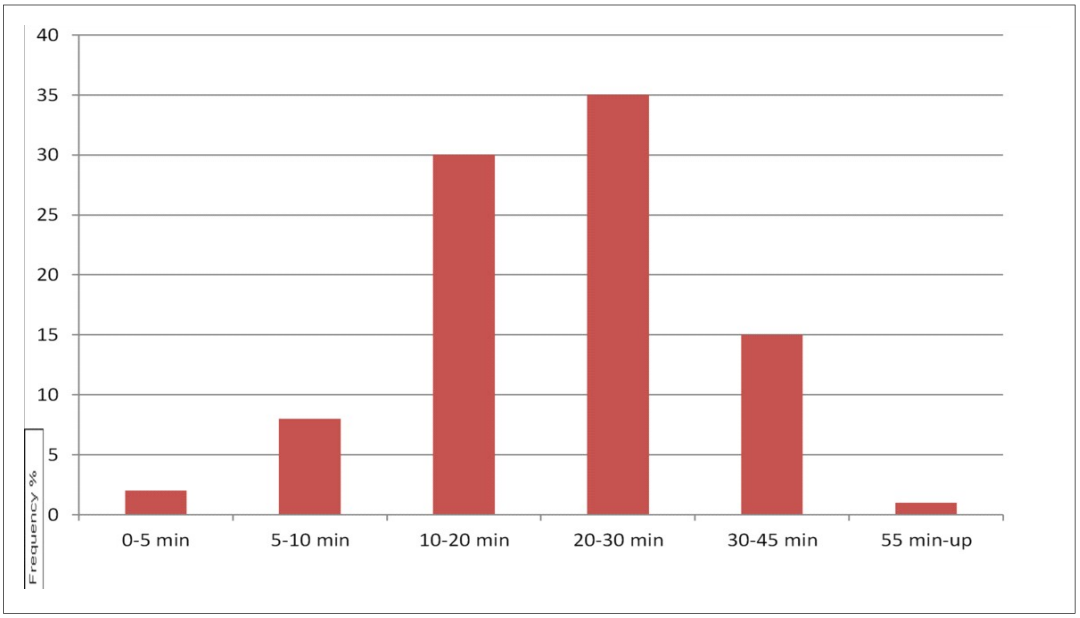


Fig 5: Training in 2 years (duration in minutes vs frequency %).

Brief description of training module

Module 1

Baking - Introduction - Types of products manufactured. Ingredients for bread, cake, biscuit-classification - role of ingredients in food manufacturing- finished products-packaging-storing-health and hygiene-personal hygiene-floor hygiene-hygiene at storage place-pests and its control. Machineries involved in bakery.- Cleaning methods - CIP-Clean-out-of-Place - Manual cleaning - Cleaning agents - Sanitizers, HACCP plan- 5 Preliminary steps-7 Principles of HACCP.

Module 2

General introduction to baking, Baking - classification - role of ingredients -Baking chemistry and technology -Quality assessment - Dough rheology- rheological properties-mixograph/ farinigraph/extensograph / viscoamylograph. Quality control, standards and Specifications.

Module 3

General Manufacturing Practice, Raw material-vendor selection- Sign of contamination-storage of raw material-What is First in First Out (FIFO)and Last In First Out (LIFO) GMP Scope-Environment and location Building and factory facilities, Fan light running Status, Facility and sanitary activity, Pest Control System, Employee's Hygiene, Process Control. Surveillance Management. Personal Hygiene-Dress code-Physical appearance code. Using soaps and sanitizer.

Module 4

General Manufacturing Practice; What is food safety, Why important- FIVE P's OF GMP- place, primary materials, people, process and product are five important factors. Food contamination-sources of contamination, Pest Prevention and control-Pest control measures-Good Hygiene Practice. What is Good Hygiene Practice(GHP), Employee's hygiene requisite:- Maintaining their body hygiene.- Wearing working outfit and its equipment.- Covering any wounds- Always washing hands using soap.

Module 5

Some special hand washing rules as part of GHP for food workers with practical demonstration.

Module 06

Demonstration of colour coding of material, disposal of waste, 'Do's' and Don'ts in manufacturing area relating to GMP, GHP for food workers with the help of picture.

Module 07

Understanding and following of checklists as part of GMP, GHP procedure for workers as quality and Production personnel.

CONCLUSION

As consumers can't always tell whether food products are safe just by looking at them, manufacturers have a tremendous responsibility to provide safe, quality foods to the public. Training to workers and subsequently following GMPs and GHPs rules help to promote quality, ensuring safe products for mass distribution and subsequent consumption. This increases the likelihood of products being free of dangerous substances or contaminants that could cause harm to consumers which in turn make the food safe. This in turn benefits the company in the long run.

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Disclaimers

The views and conclusions expressed in this article are solely those of the authors and do not necessarily represent the views of their affiliated institutions. The authors are responsible for the accuracy and completeness of the information provided, but do not accept any liability for any direct or indirect losses resulting from the use of this content.

Informed consent

No animal procedures for experiments. However, animal procedures, if any, were approved by the Committee of Experimental Animal care and handling techniques were approved by the University of Animal Care Committee.

Conflict of interest

The author declares that there are no conflicts of interest regarding the publication of this article. No funding or sponsorship influenced the design of the study, data collection, analysis, decision to publish, or preparation of the manuscript.

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