

Antibacterial Activity of Fermented Whey on Some Selected Enteropathogenic Bacteria

Jaiswal K. R., A.M. Garode

P.G. Department of Microbiology, Shri Shivaji Science & Arts College, Chikhli, Buldana, Maharashtra, India

ABSTRACT

Probiotic applications in food and feed also require safety assessments including bacterial resistance to antibiotics. The antimicrobial tests of the whey were tested on the test strains of pathogens by using the agar-gel diffusion inhibition test. The assessment of antimicrobial activity was based on measurement of inhibition zones formed around the well. Disc diffusion method did not produce recordable results for all the four type of whey samples against the pathogens. Bioactive peptides present in milk whey are one of the most studied compounds in different dairy products. These bioactive peptides are produced by enzymatic hydrolysis during fermentation and gastrointestinal digestion. Whey is a popular dietary protein supplement that is well known to possess antimicrobial activity, immune modulation, improved muscle strength and body composition.

Keywords: Probiotic, antimicrobial activity and dairy products.

I. INTRODUCTION

Whey is the liquid remaining after milk has been curdled and strained. It is a byproduct of the manufacture of cheese or casein and has several commercial uses. Sweet whey is a byproduct produced during the manufacture of rennet types of hard cheese, like Cheddar or Swiss cheese. Acid whey (also known as sour whey) is a byproduct produced during the making of acid types of dairy products, such as cottage cheese or strained yogurt. Whey proteins consist of α -lactalbumin, β -lactoglobulin, serum albumin, immunoglobulins, and proteose-peptones (Farrell, 2004). Probiotic applications in food and feed also require safety assessments including bacterial resistance to antibiotics. In European countries, a guideline to determine whether a particular bacterium is safe for food or feed application is available (EFSA 2008).

Whey is the yellowish liquid extract derived from production of fermented dairy foods. It is one of the components that can be separated from milk after

curdling when rennet or an edible acidic substance is added. Whey is mainly water, but it also contains lactose, minerals, along with traces of fats and non-acid milk protein called whey protein. Because whey contains lactose it should be avoided by those who are lactose intolerant. Whey has long been recognized as the best source of protein supplementation to repair tissue and to build muscle. Whey protein is a mixture of globular proteins, its effects on humans health are of great interest and are currently being investigated as a way of reducing disease risk, as well as a possible supplementary treatment for several diseases (Walsh et al., 2010). The attempt was made to study the antibacterial activity of whey against human pathogenic bacteria.

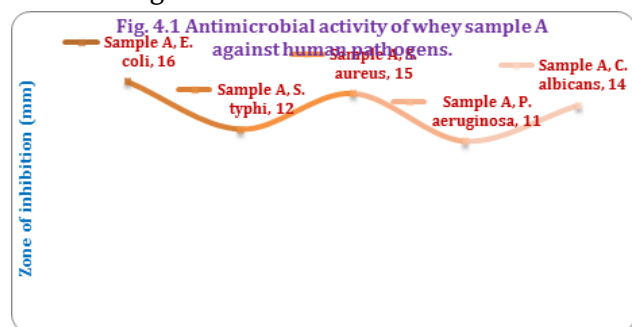
II. MATERIAL AND METHODS

Whey samples were collected from individual home and market curds in sterile steel container. The antibacterial and antifungal tests of the whey were tested on the test strains using the agar-gel diffusion

inhibition test. The Muller Hinton agar was used for the study. Incubate the plates at 37°C for 24 to 48 hrs. After incubation observed the zone of inhibition and measure it with the help of plastic antibiotic zone reader scale. Note down the observations and results (Collins and Lyne, 1980).

III. RESULTS AND DISCUSSION

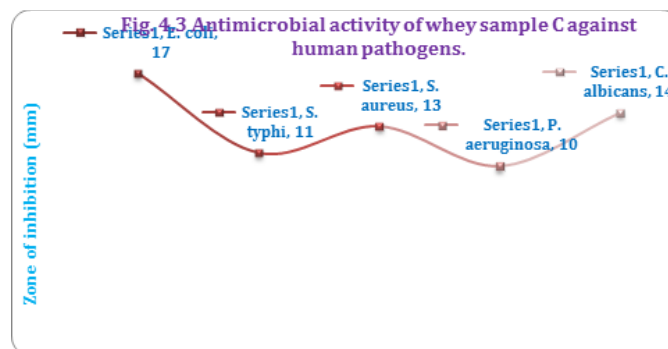
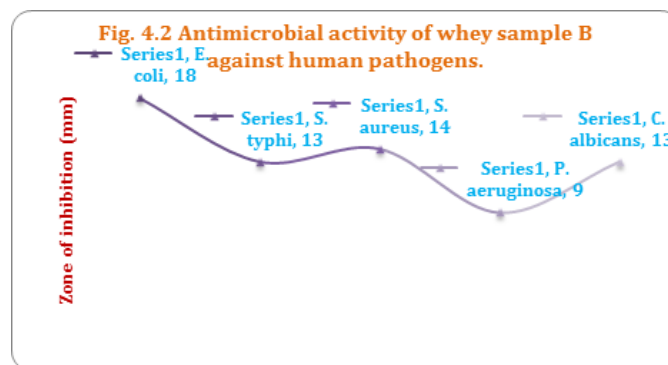
The results of the study showed that the whey indicates the presence of potent antibacterial activity, which confirms its use against infection. The assessment of antimicrobial activity was based on measurement of inhibition zones formed around the well. Disc diffusion method did not produce recordable results for all the four type of whey samples against the pathogens. The whey was produced larger zones of inhibition against the bacteria. Sample A pure honey was exhibited maximum antimicrobial activity. In antibacterial analysis, the maximum zone of inhibition was found against E.coli (16mm) followed by S. aureus (15mm), S.typhi (12mm) and least activity against P.aeruginosa (11mm). While the Candida albicans was exhibited maximum antifungal activity (11mm) which was shown in figure 4.1.



The bioactive peptides as substances that can affect the biological processes of the body functions with beneficial effects. These biologically active peptides can be generated and activated by different mechanisms including: (a) protein hydrolysis by digestive enzymes (b) food processing and (c) proteolytic activity by enzymes derived from

microorganisms, especially lactic acid bacteria. Potent biologically active peptides have been isolated from a number of fermented dairy products such as cheese, fermented milk and yoghurt (Moller et al., 2008).

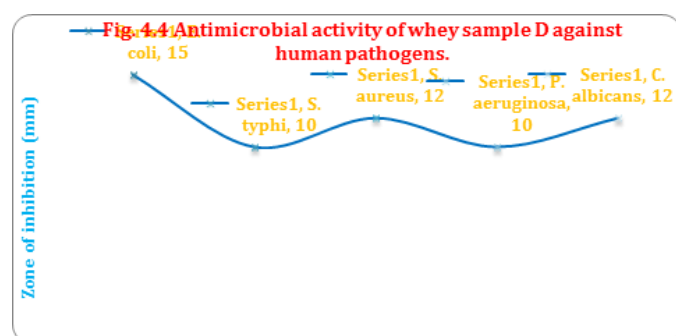
In the antimicrobial activity, sample B of market available honey was also exhibited maximum antimicrobial activity. In antibacterial analysis, the maximum zone of inhibition was found against E.coli (16mm), followed by S. aureus (15mm), S.typhi (12mm) and least activity against P.aeruginosa (11mm). Lastly, Candida albicans was shown maximum antifungal activity (14mm) which was shown in Figure 4.2.



From the Figure 4.3, it was found that the antimicrobial activity was reported and result found that, the maximum zone of inhibition was shown against E.coli (17mm) followed by S.aureus (13mm), S.typhi (11mm) and least activity against P.aeruginosa (10mm). Candida albicans was reported maximum antifungal activity (12mm).

Bioactive peptides present in milk whey are one of the most studied compounds in different dairy products. These bioactive peptides are produced by enzymatic hydrolysis during fermentation and gastrointestinal digestion. Thus, fermented dairy products like yogurt, cheese and buttermilk are gaining popularity worldwide and are considered as an excellent source of dairy peptides.

Finally from the Figure 4.4, it was found that the antimicrobial activity of the whey was observed and result found that, the maximum zone of inhibition was exhibited against *E.coli* (15mm) followed by *S.aureus* (12mm), and least activity against *S.typhi* and *P.aeruginosa* (10mm). *Candida albicans* was reported maximum antifungal activity (12mm). The assessment of antimicrobial activity was based on measurement of inhibition zones formed around the well. Disc diffusion method did not produce recordable results for all the four type of whey samples against the pathogens. The whey was produced larger zones of inhibition against the bacteria.



Similar findings of Hussein et al., (2015) detection of the antibacterial activity of bioactive peptide isolated from fermented buffalo milk in vitro. The results showed that the bioactive peptides of fermented milk have good antibacterial activity in vitro. *E. coli* was more effective than other bacteria. Kar and Mishra (1999) showed that bioconversion of whey for preparation of beverage was standardized by utilizing yoghurt cultures. The factors affecting the antibacterial activity of wheyghurt drink against

Escherichia coli, *Staphylococcus aureus*, *Shigella dysenteriae* and *Bacillus cereus* were determined.

IV. CONCLUSION

Whey protein is a mixture of globular proteins, its effects on humans health are of great interest and are currently being investigated as a way of reducing disease risk, as well as a possible supplementary treatment for several diseases. The growing resistance of microorganisms to conventional antibiotics is becoming a serious concern to microbiologists and health care practitioners all over the world. Bioactive whey ingredients such as bioactive proteins which exert an additional health benefit for the consumers and are increasingly used in pharmaceuticals as well as nutraceuticals. Whey is a popular dietary protein supplement that is well known to possess antimicrobial activity, immune modulation, improved muscle strength and body composition.

V. REFERENCES

- [1]. Collins, C.H. and Patricia M. Lyne (1980). Microbiological Methods. Butterworth World Student Reprint, London.
- [2]. European Food Safety Authority. (2008). Technical guidance prepared by the scientific panel on additives and products or substances used in animal feed (FEEDAP) on the update of the criteria used in the assessment of bacterial resistance to antibiotics of human or veterinary importance. The EFSA Journal 732, 1-15.
- [3]. Farrell, H.M.; Jimenez-Flores, R.; Bleck, G.T.; Brown, E.M.; Butler, J.E.; Creamer, L.K.; Hicks, C.L.; Hollar, C.M.; Ng-Kwai-Hang, K.F. (2004). "Nomenclature of the Proteins of Cows' Milk—Sixth Revision". Journal of Dairy Science. 87 (6): 1641-1674.
- [4]. Hussein, Moshtaq Talip, Eman M. Jarallah, Abuallah Khadum Hindi (2015). Detection of the antibacterial activity of bioactive peptide isolated

from fermented buffalo milk in vitro. IOSR Journal of Pharmacy and Biological Sciences (IOSR-JPBS), 10 (6) Ver. III: 21-24.

- [5]. Kar, T. and A.K. Misra (1999). Therapeutic properties of whey used as fermented drink. *Revista de Microbiologia*, 30:163-169.
- [6]. Moller N, Scholz-Ahrens K, Roos N, Schrezenmeir J (2008). Bioactive peptides and proteins from foods: indication for health effects. *European Journal of Nutrition*, 47, 171-182.
- [7]. Walsh, H., Ross, J., Hendricks, G., and Guo, M. (2010) Physico-chemical properties, probiotic survivability, microstructure, and acceptability of a yogurt-like symbiotic oats-based product using pre-polymerized whey protein as a gelation agent. *J. Food Sci.* 75, M327-M337.