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A comparative shelf life study of food cooked in aluminium pot and unglazed earthen clay Pot

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Abstract
Traditionally we are using unglazed or glazed pots or vessels for cooking and now we shifted to various other vessels such as steel *kadai*/ pot, non-stick cookware, aluminium vessels etc. This research is an attempt to comparatively analyse shelf life of food cooked in unglazed earthen clay pot and aluminium pot. Food cooked in both variety of pots were analysed by TPC (Total Plate Count) method. Results shown better shelf life of food cooked in unglazed earthen pot than food cooked in aluminium pot. Further, there is need to measure growth of pathogenic microorganisms in food cooked in earthen pot and food cooked in other cooking vessels.

Keywords: cooking in earthen pot, effect of food cooked in earthen pot, microbial analysis of food cooked in unglazed earthen pot, traditional cooking methods, unglazed earthen pot cooking

Introduction
From centuries ago, we are using clay or earthen pots (glazed and unglazed) and iron utensils for cooking. Now we have shifted to modern cookware such as non-stick pans, non- stick *kadhai*, pressure cookers etc. Also we are using various grinders, mixers, microwave oven for size reduction and easy cooking viz. Our parent remembers the taste of food cooked in earthen pot. It is now important to understand the key facts of using earthen pots for cooking.

Cooking in earthen pots takes long time for cooking as compared to short time in pressure cooker. Although some people like typical taste of food cooked in clay pot. Wear and tare of earthen pots or clay pots is difficult, as we have to use scrubbers instead of using detergents. There are chances of leaving traces of detergent in small holes of earthen pots which may further interfere in cooking. Earthen pots are prone to breakage if not handled carefully.

There are various researches conducted for the type of cookware base has to be. Executive committee of the German NGO, studied the form of the cooking vessel to the heat transfer efficiency of the stove/pot system. Study concluded that a rounded (convex) pot bottom increases the surface available for heat transfer and, hence, heat transfer efficiency. Research further suggests that combustion-efficient stoves combined with rounded-bottom vessels were favorable to the same stoves in combination with flat-bottom stoves.

Kandavel S. *et al*., studied effect of cooking vessel (Aluminium, Earthen pot, Stainless Steel, Teflon and Glass) on the concentration of fluoride in the water used for cooking and also its effect on fluoride levels after storage for 24 hours. There was an increase in fluoride concentration in water boiled in Teflon, Stainless Steel vessels, whereas a decrease was observed in Aluminum, Earthen Pot and Glass vessels. Increase in fluoride concentration in water boiled in Teflon and Stainless Steel vessels was a statistically significant. This is alarming in fluorosis prevalent areas.

Another research conducted for safety of eating food cooked in earthen pot by Nsengimana H. *et al.* regarding heavy metal leaching in food cooked in earthen pots showed Lead (Pb), Cadmium (Cd) and Iron (Fe) were transferred in considerable amounts which exceeded the safe limits established by WHO. As heavy metals are toxic in trace concentrations, due to bioaccumulation, traditional clay pots constitute a public health hazard when used as food contact material. However, as the geochemical properties of clay are different from regions to region and the techniques of making them differ, further studies should be undertaken to check the leachability of these heavy metals from different type of pots.

Naddaf K *et al.* evaluated efficiency of Clay Pots, filters, pipelines in Removal of Water Impurities such as turbidity, water color, total and permanent hardness, total dissolved solids (TDS), electrical conductivity (EC), turbidity, color and nitrate (NO3).

We need to understand the science behind use of earthen pots or utensils for cooking. The present study compares growth of microorganisms in food cooked in earthen pot and aluminum vessel.

There are researches of aluminium leaching in water but there is no research of measuring shelf life stability of food cooked in earthen clay pot and aluminium pot. In present study we tried to analyse the same.

Objective
1. To find relation between shelf life and earthen pot cooking.
2. To find growth of pathogenic microorganism especially indicator microorganism- Salmonella in earthen pot cooked food and aluminium pot cooked food.

Materials and methods
There are various ways of starting cooking in clay pot. Unglazed clay pot and glazed clay pot require preparation

before cooking commence. It is suggested to immerse it in a clean bucket of water for at least one hour. You can leave it overnight in a sink completely covered with water. Remove the pot from the water and allow it to dry thoroughly. Another way to prepare clay pot for cooking is add oil and water and bake it or heat it on gas stove for 10-20 minutes. Combination of both methods selected for preparing unglazed earthen pot for cooking. Unglazed earthen pot was filled with water and emptied after half an hour. Again filled with drinking water and boiled for 15 minutes. Boiled water discarded and filled fresh water and kept overnight standing. Next day cleaned unglazed earthen pot left for drying under sunlight.

Simple Dal-Khichdi recipe selected for the experiment. One sample of dal-khichdi cooked in earthen pot and another sample of dal-khichdi cooked in unglazed earthen pot. Cooking time required for earthen pot and aluminium pot were 10 and 17 minutes namely. Water required for cooking was more in earthen pot. Both samples kept for 2 days. Microbial analysis conducted by TPC- Total Plate Count method with Nutrient agar by Hi Media. Observations shown in following table.

Table 1

Sample	Plate count
Earthen pot cooked food	7
Aluminium pot cooked food	39

Table 2: Experiment repeated again with Potato dextrose agar by Hi Media. Observations are as follows:

Sample	Plate count
Earthen pot cooked food	1
Aluminium pot cooked food	5

Conclusion and discussion

Plate count in Nutrient agar for earthn pot cooked food as 7 and plate count in nutrient agar for aluminium pot cooked food as 39. Sample of earthen pot and aluminium pot showed plate count of 1 and 5 viz in Potato dextrose agar. Potato dextrose agar is commonly used for assessment of mold growth. Food cooked in Earthen pot showed better shelf life as compared to food cooked in aluminium pot.

There are differences of cooking method and time in both varieties of pot for cooking. Cooking in earthen pot takes longer time as compared to aluminium pot or kadai. It takes approximately double time than cooking time required in aluminium pot. Moreover water required for cooking was in greater quantity in earthen pot as compared to water required for cooking in aluminium pot. This might be due to the principles of cooking in earthen pot and aluminium pot was different. Metal conducts heat in aluminium pot and pours present in unglazed earthen pot vaporizes water and cooking commence.

Further scope

Results of this experiment shows good shelf life of food cooking in earthen pot as compared to aluminium pot. Further research should be extended for nutritive values comparison between food cooking in earthen pot and other varieties of cooking pot such as steel, aluminium, non-stick, iron etc. Scope of research further can be extended by statistically analyzing results and showing significance with large sample size.

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