INTRODUCTION:

Bread in one of the widely used classically nonmentioned edible. It is preferred by all the person irrespective of age, sex, occupation, religion & income. Even though the history shows that bread is having no mention in classical ayurvedic texts, it was well known in the period of 100 B.C. in Rome. History of bakery processes is traced upto classical Egypt & Italy. It is learnt from history that initially bread was prepared from wheat, maize rye, barley, millet & oat. At the beginning flour was mixed with water & left for a while to achieve fermentation. After introduction of scientific advance yeast was used for quick fermentation. This process was first used in England in 1792. In 1868 it was introduced on large scale. In 1915 modern methods like temperature control, product handling, oven fuels & refrigeration were commissioned.

5.1) Preparation of Bread:

Bread is a bakery product made out of wheat dough, is raised by yeast or other gas forming agents. Some of the gases are trapped in the dough which is set by heat. The major ingredients are flour & water, salt in a small amount is added to dough. Yeast is another
ingredient required for process. Average white bread formula is as further.

i) Wheat flour 100 Kg.
ii) Water 60-65 Kg.
iii) Yeast 2.75 Kg.
iv) Salt 2.00 Kg.
v) Sugar 6-7 Kg.
vi) Enzymes (if necessary) 4.00 Kg.
vii) Non-fat dry milk 3.00 Kg.
viii) Yeast food 0.4 Kg.

The maintenance of temperature during the raising process, skillful kneading & proper baking are required.

First wheat flour is mixed with yeast & salt then kneaded with warm water to form a dough. Yeast is allowed to act for a couple of hours. So that part of starch is converted to glucose, alcohol & carbon dioxide. The dough rises. The pieces of raised dough are baked at 240-300 °C. During the process all the yeast is killed. The Carbon dioxide expands forming bubbles. Bubbles come out of dough. The outer portion of dough becomes hard due to Coagulation of proteins. Starch is converted to dextrin to form crust. The brown appearance is due to formation of caramel from glucose. White portion of the bread is called the crumb (129).
Dravya-Samyoga

Wheat

Water

Yeast

Sugar

Salt

Mill Powder

Samikśra

Time (Kala)

Oven - Bhatti (Agni)

Bhakshya

Bread
A few types of bread are available in market. White bread is made from finely sifted wheat flour. Whole bread is made from unsifted wheat flour. In milk bread a small amount of skimmed milk powder is added. Very small pieces of carica papaya popularly known as cherry are also added occasionally.

The ingredients, sequence of combination, time factor and heat contact required for manufacture of bread is to be looked into by āyurvedic viewpoint. For this one has to consider all of them according to āyurvedic principles. For this the āyurvedic concept is to be understood as thoroughly as possible.

5.2.) ĀYURVEDIC CONCEPT

According to Ayurveda knowledge of every object can be considered by four ways (130 to 134).

A) Pratyaksha-direct examination/observation/
   /experience/Experiment.

B) Anumana- inference.

C) Upamāna-Comparison

D) Sabda- Reference of the authentic texts & words & by reliable unbiased persons.
A) **Pratyaksha:**

The effect of bread on healthy persons can be detected by practical experience. The same was confirmed during the project.

B) **Anumāna:**

Considering the components & processes along with their qualities the total properties of the bread can be judged (135). Properties of the bread can be deduced theoretically as further.

Components

1) Wheat flour is the major component. Wheat is sweet, cold, heavy & kaphaprovocative (136). Grinding of...
of whole wheat causes somewhat lightness, which makes it light for digestion. Wheat flour (Maida) is specially prepared excluding germ which is slight oleative. Hence flour becomes dry in nature.

ii) Wheat flour is mixed with water to form a dough. Water is cold, heavy, kaphaprovocative & oleative (137). Further in the process it is dried in furnace. However bread is having more water contents than rotacapati.

iii) A small amount of salt is added while preparing dough. Salt is saline in taste, hot & secretive guje in nature. It is kapa-pittaprovocative (138,139).

iv) Yeast is added in dough which causes fermentation. It shows that yeast is agneya' (hot) in nature. Yeast may be indentified as kinwa. Yeast is yellow, sour odoured, non-adhering powder. The qualities observed lead one to call it Agneya. It is an advised ingredient for antiphilogistic action (Pācana, Upanāha) in classical texts (140). Thus it adds to pitta provocative capacity as

---

137] -स्वतः सुप्तर्वं ति अर्ज्जितामः नित्यं विष्क्तं श्चितलयं \ T
विक्ष्यत्ति नादिः निन्दितं पीयुष्मवृ जीवनयु \ T भाष.पृ. वारिक्यः

138] विक्ष्यत्ति लक्ष्यं सर्वं सूक्ष्मं लक्ष्मलं मुहतः
वास्तद्वायिनी तिष्ठती तोष्णकोश्च रोगवर्तकम कफगमित्तुत्कुष \ A.भ.सू. 6/142.

139] सत्ततिन्द्रकु शार तीठ्युष्मवर्तकलेविदि चोछिन्ततिस्मयु \ A.भ.सू. 6.

140] मात्रिःलोककार्य आपितें धन्निशिः िशिष्येँ \ T
हैमदेकः सुशास्त्रः फिनियार्जिनः प्रस्तुताने शास्त्रायु \ A.भ.च. 5/89. 90.
this action is hot in nature.

v) A small amount of vegetable oil is used. It is oleative, hot & pittaprovocative (1408).

**Processes:**

Processes play a significant role and therefore their nature should be given weightage while establishing the properties of recipes. The process may change totally the properties of the base/original ingredient. These include dilution, moistening, application of heat in form of vaporisation, boiling, steaming, frying, distillation by using furance/over etc, purification, churning, emulsification, storing in particular utensils, maturing, keeping a while, flavouring, impregnation, preservation & contact with utensils' (141).

To have exact knowledge of processes local well known bakeries were visited personally.

Mixing of wheat flour with water is kledan, a moistening samskāra, Mixing of yeast & keeping for a while cause fermentation. The fermentation is a process of
amlaprapaka. This prapaka is pittaprovocative in nature. (142). In this process the dough loose its adhering quality by acidic partial digestion. This makes the dough lighter for digestion. There is again an agnisanskara (controlled contact of heat) in the form of oven. Thus the bread may become more light for digestion and pitta-provocative (143.) The natural appearance of the dough is completely modified. This itself is indicative of more heat contact. In manufacture of roti (polika) or chapati the flattened dough does not modify its form as porous bread. This makes it clear that the contact of heat is more in manufacture of bread.

To summarise the main process (Sanskara) evolved in bread preparation are ...

i) Toya (Kledan)
ii) Kāla (Keeping a while)
iii) Agni (baking)

These are the three main factors by the variations which cause modifications in the substance by the variations of their proportions. To estimate the patterns of modifications one has to consider contact of these to a substance in permutation & combination pattern of understanding. To have a very simple example the time period

---

कृत्यमानम्: पिरसा - कृत्यमानम्: II व.स. 1/66.
193] उदयाठिक: सुकुमारसुधुधिवाद सारसुङ्गलालानि -कामेलानि: II व.स. 26/??
allowed to pass over flour & water contact in different in preparation of bread & capati. Before the contact of heat is scheduled this contact may be compared to the natural phases of digestion," Prapāka. One can say that flour & water contact for preparing capati, which is up to 30 minutes is shorter than the average period required for the madhur prapāka. This flour & water contact in bread preparation is 2-6 hours. In comparison it can be easily said that flour water contact period prior the actual contact of heat is longer than even the amlaprapāka. Here before the contact of heat the time period & natural environmental agni (bhūtāgni) have definitely modifying nature of the end products.

The addition of baking agents such as yeast is addition of tikshna, usna quality. So the chances of modifications are on the side of quicker digestion or pittaprovocation. Then the actual heat contact however is to be weighed for possible langhankaratwa or otherwise. The higher & longer heat contact is likely to be potentiate laghu qualities in the ultimate products. The shape of the substance (sthūla-sūkshma) is to be born in mind. And after considering the shape the inside architecture of the substance is to be accounted, Because it may modify the effect of the substance on body.
The nature of agnīsanskāra may be evaluated by considering 4 points.

i) Temperature at which the recipe is prepared.

ii) Total duration of contact with agni i.e. heater/oven/hotplate etc.

iii) Thickness & consistency of dough/recipe.

iv) Surfaces of the recipes which are to be baked.

In the case of bread the temperature required for baking is 200-300°C. It is higher than routine recipe chapati. For chapati it is 100-200°C as we measured on the hotplate by thermometer. Duration of contact of heat/baking time for bread is 15 minutes to 2 hours. As this time increases the hardness in bread is increased, Chapati requires baking not more than 1-2 minutes. This is also on positive side to agnikaratwa. Thickness of the bread is in few centimetres and it is baked from all the sides, whereas thickness of chapati is in fraction of centimetre and is baked first by one surface & then on another surface. Bread is baked in closed room or oven, & chapati in open air. This also shows that bread is having more agnisanskara which may add pitta-qualities in bread.

Here one may compare chapati & bread because basic ingredients in both recipes are same. The difference is in sanskara. Chapati is sweet & somewhat Kaphaprovocative, pittavāta annihilative in nature if consumed in excess, but the bread may not be kaphaprovocative due to sanskara perhaps it may add pittavātaprovocative quality.
Physical Nature of Bread

Structure of bread is porous one. It contains numerous small cavities. This is ākāśabhuta. It adds to vātā provocative capacity (144). Outer surface of the bread is somewhat whitish, brownish, and rough. Roughness is a vātā attribute (145). So the eating of bread may cause vātaprovocation as per sāmanyaviśeṣāsiddhānta (146). One can eat roti, chapati only by chewing but not the bread. This also suggests that bread is dry in nature. We consume bread along with tea or milk or other beverages. It absorbs more liquid compared to roti, chapati. This also indicates that bread is porous and dry in nature.

Considering the above facts from the theoretical ayurvedic understanding it is claimed that bread is sweet, dry, light, smooth & somewhat hot in nature. It may cause vātāpittāprovocation (147 to 150).
Diagram showing Seat Hours after Prapāka - Dosaprominency:

- Āmāśaya: 1-2 - Madhur - Kapha
- Pacyamānāśaya: 2-4 - Amla - Pitta
- Pakvāśaya: 4-6 - Katu - Vata

Diagrammatic representation of Prapāka & dosa prominence.
C) **Upamāṇa**

Comparision of the bread with well known & classi-
- cally mentioned edibles will be useful. A method based
- on this pattern is evolved in the present study.

D) **Sabda :**

There is no classical mention of bread. So the
opinion of the practical users & observers will be
useful in this concern.

5.3.) **ASSESSMENT OF VIPAKA OF BREAD :**

After ingestion, digestion of food takes place in
three sequential stages called as prapāṭha (avasthāpāṭha).

These stages are sweet (madhura), sour (smaś & pungent
(katu). These are formed respectively in āmāśaya, paccya-
manāśaya, & pakwāśaya. Each prapāṭha is prominent in one
dosha sweet is prominent in kapha, sour in pitta & pungent
in vata. The prominency of prapāṭha depends upon the tem-
porary more secretion of dosha (dosa astravana) during
that particular stage. In the event the food taken of
sweet character the more secreted kapha is not exausted
in antagonising the food components. Consequently the
phase of kapha having hypersecretion is observed for
relatively longer time. The pungent sour dominance in
diet required more kapha to antagonize them. The tem-
orarily more secreted kapha gets quickly exausted. The

The same is the case with pitta and vata (151). The recipes containing dosasimilararmahabhuta promote more secretion. Thus these lead to related dosaprovocation.

Sign symptoms of that dosaprovocation are seen during & soon after digestion. It will be interesting to note that sign symptoms of provoked dosa are seen throughout the body and they exactly correlate with those in kostha, (āmāśaya), Paccyamanāśaya & pakwāśaya) (152).
Prapāka may indicate pāncabhautic constitution or dosic tendency e.g. If one takes sweet items madhur prapāka is prominent. If one takes sour, pungent, substances, amla prapāka is prominent. If pungent, astrigant items are consumed katu prapāka is prominent. Symptoms related to concern rasa (taste) are seen in prepāka stage. By observing prominent prapāka & Vipāka of a certain item, one can conclude dosic tendency of that substance. Therefore efforts are made to find out the same of the bread. For this purpose specific method was evolved.

5.3.1) EVOLVEMENT OF METHOD TO ASSESS VIPĀKA

To establish definite method to ascertain the vipāka of a known or unknown recipe, certain experiments are were carried out on volunteers. It was decided to give a classical recipe in a definite quantity for a definite period to the healthy volunteers. Sign symptoms seem during the digestion were noted and decision regarding vipāka was taken. Properties of capati are described by textes. These are compared to observations. Thus the method was verified and used for classically nomentioned edible bread.

A) EKANGGRAH METHOD

Ekanga-graha means to consume only one recipe at breakfast time. 100 gm. of capati with 100 ml. milk was given at 8.30 am. to 10 healthy volunteers for successiv
three days. Symptoms seen after eating capati were recorded on special format with respect to time factor. Special attention was given towards onset of hunger & defecation. No restriction was laid down on daily routine work.

OBSERVATIONS (TABLE NO 7)

<table>
<thead>
<tr>
<th>Time</th>
<th>Symptoms seen</th>
<th>No of persons out of 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upto 2 hours</td>
<td>Udgār</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Trupti</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Truṣṇā</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Jrumbhā</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Utsāha</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Gaurava</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Udarsula</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Alasya</td>
<td>1</td>
</tr>
<tr>
<td>2-4 hours</td>
<td>Truṣṇā</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Alasya</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Udarsul</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>Jrumbhā</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>Amlıkā</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>Udarḍāha</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>Gaurava</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>Udgāra</td>
<td>—</td>
</tr>
</tbody>
</table>

Sense of hunger after 4 hours.
RESULTS & DISCUSSIONS:

The time upto 2 hours after eating, is prominent in kapha. When one eats recipes having kapha similar properties, this kaphakāla gets extended or becomes more prominent showing kapha symptoms. In present study capāti is prepared from wheat. Wheat is sweet, heavy & kaphaprovocative. Hence it is obvious that kaphaprominent symptoms as trupti, udgar are seen.

Thirst is pitta symptom, pittakāla is seen after 2 hours of eating. It means pitta prominent symptoms are bound to occur in an average case. In the present study truṣnā was seen after 2 hours which is as expected by the texts.

Hunger was reported after 4 hours. It suggests that 100 gm. capāti is not so heavy for digestion. No remarkable effect on elimination of stool was seen Elimination of stool depends upon the nature of stool and digestion. Nature of stool is related to diet and digestion. e.g. If diet is kaphaprominent stool becomes kaphaprominent. In present study stool was seen as usual. It means capāti consumed in ekanaraha pattern do not effect an elimination of stool. Perhaps it may be inadequate to effect stool.

Thus the information obtained during the study
exactly correlates the opinion of texts regarding properties of capati. (¶ 132 B). Hence it can be concluded that this method may be applied to establish the vīpāka of unknown recipe practically.

B) **SARVAGRAHA METHOD**

To ascertain the properties of usual diet (Swasth-hitakara ahar) for healthy persons a study was conducted. Doṣaprovocative property of the routine standards diet was evaluated. It was decided to compare classical diet with classically non mentioned diet in respect to doṣaprovocative capacity.

10 healthy volunteers were given routine diet containing capāti, boiled rice, sāmbar, kari & vegetables for successive three days at definite time intervals. They were allowed to eat as they can. Timings of meals were fixed at 10 a.m. & 7-8 p.m. There was light breakfast consisting of tea or coffee at 8-9 a.m. Daily work was allowed. Symptoms seen throughout the day were recorded.

Heaviness & jrumbha were prominent just after meal. Amlodgar was not recorded. Truṅā, udardāha, urovidāha & Udarsūl, were more or less absent.

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132] ज्योतिषमयाभोजं चक्षुंत वातस्य ऊर्ध्वः ।
शुच्यं मधुराव्याके पितामही श्राद्धं तत्र छ। निरुर्ध्वः
Bowels were regular with normal stool. Volunteers enjoyed routine duty & sound sleep.

Routine traditional combination of diet shows no prominent dosaprovocation. It caused normal hunger, defaecation, micturation, sleep & daily work. This pattern of diet may be termed as swasthahitakara. It was decided to compare this condition to nontraditional diet by this method. This method will provide definite way to establish dosaprovocative capacity of nontraditional diet.

Method evolved from previous experiments to determine desaprovocative properties of recipe was practiced for bread.

5.3.2) **EKANGARAH method** :-

1) Methodology :-

25 healthy volunteers of the age group 20-24 years were selected for study. All of them were having a built body, a good appetite, regular bowels & micturation & no complaints. They were properly oriented & introduced with importance of the study. Thus the complete Co-Operation & credibility were achieved.

140 gms. of bread with 100 ml of tea was given as bread fast at 8-9 a.m. The quantity of bread which one could eat more was judged and noted. The sign symptoms seen after eating the bread, as the hours progressed were noted on format. Meanwhile sensation of hunger and
urge to pass stool were keenly noted. Special attention was given to note the symptoms related to awasthāpāka. After having sense of hunger, usual meal was allowed. No restriction on daily schedule was laid down. The experiment was carried out for successive three days. Sign symptoms seen in all the three days were collected & subjected to study.

ii) Observations :-

( Table NO 8)

<table>
<thead>
<tr>
<th>Sr. NO</th>
<th>Time</th>
<th>Symptoms seen</th>
<th>No of Persons out of 25</th>
<th>Perc. Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Upto 2 hours after eating bread</td>
<td>Āalasya (laziness)</td>
<td>3</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gaurava (heaviness)</td>
<td>7</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Jrumbhā (Yawning)</td>
<td>15</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Trupti (Satisfaction)</td>
<td>22</td>
<td>88</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Trusnā (Thirst)</td>
<td>20</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Udgar</td>
<td>23</td>
<td>92</td>
</tr>
<tr>
<td>2</td>
<td>2-4 hours</td>
<td>Amlīkā (acidic regurgitation)</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gaurav (heaviness)</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Jrumbhā (Yawning)</td>
<td>8</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Trusnā (Thirst)</td>
<td>16</td>
<td>64</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Udardāna (burning sensation in abdomen)</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Udgar</td>
<td>3</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Udārsūl (pain in abdomen)</td>
<td>4</td>
<td>16</td>
</tr>
<tr>
<td>3</td>
<td>4-6 Hours</td>
<td>Āalasya (laziness)</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Udardāna</td>
<td>2</td>
<td>8</td>
</tr>
</tbody>
</table>
TABLE NO 9

TABLE SHOWING ONSET OF HUNGER AFTER EATING BREAD

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Time after eating bread</th>
<th>No of Persons</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1)</td>
<td>Upto 2 Hours</td>
<td>NIL</td>
<td>NIL</td>
</tr>
<tr>
<td>2)</td>
<td>2-3- Hours</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>3)</td>
<td>3-4- Hours</td>
<td>20</td>
<td>80</td>
</tr>
<tr>
<td>4)</td>
<td>4 onwards.</td>
<td>4</td>
<td>16</td>
</tr>
</tbody>
</table>

TOTAL 25 100

It is clear from the table on side page that

i) In first two hours after eating the bread, the commonly seen symptoms were trupti (satisfaction), udgar trugnā (Thirst) & Jrumbhā (Yawning). The rarely seen symptoms were gaurava (Heaviness) ālaya (laziness) & utsāha (vigour).

ii) In the period two to four hours after eating bread the commonly seen symptoms include udarśul (pain in abdomen) amlika (acidic regurgitation), jrumbhā, udgār, udardāha (burning sensation in the abdomen).

iii) 3.45 hours after eating the bread sense of hunger was recorded. The volunteers were allowed regular meal afterward.
iv) In the period of 4-6 hours after eating bread no specific symptoms were recorded.

v) No remarkable alteration on defecation & micturation was recorded.

vi) Routine manual was not disturbed.

iii) RESULTS & DISCUSSIONS

i) The period up to 2 hours after eating is of madhuar prapāka symptoms of kaphaprovocation are expected in this period. Bread is prepared from wheat which is sweet, heavy & kaphaprovocative. The symptoms expected during this period are gaurav & ālasya. But practically these are rarely seen. On the other hand jrumbhā is seen which is vāta symptom (153). This may occur before meal or 6 hours after (eating) meal in an ideal case. Thus one may conclude that bread is having some attributes leading to vātprovocation. It is having less tendency to kaphaprovocation.

Trusha is a pittasymptom (154, 155). It is expected after 2 hours of eating in an ideal case. In the case of bread it is seen within two hours after
eating. That means amlapr̥pāka starts at an early stage in the case of bread. This may cause pittaprovocation. A pr̥pāka standing longer adds the concern dosaprovocative property.

Trupti & udgar originate from āmāśaya. These symptoms denote the satisfaction of eating. Thus bread causes kshutkshānti.

ii) The period 2-4- hours after eating is of amala-pr̥pāka in general. The symptoms recorded in present study include udarsul jrumbhā, amlika, udgar, udardāha. All of them are pittaindicative except āsula. (156, 157) Sula indicates vātaprovocation (158). Sula may be seen in vātakala i.e. katupr̥pāka. Invātaprominent disease āsula is increased in this stage. Early occurrence of āsula denotes vātaprovocative property of bread.

iii) Sense of hunger (Kshut pravruti) was recorded at an average 3.45 hours after eating 140gm. of bread with 100 ml. tea. It means bread is neither light nor too heavy for digestion.

iv) Regular meals were consumed after sense of hunger. Upto 6 hours after eating bread no specific symptoms were recorded. Ādhāmāna gudgudayana & āsula routine. It is
were absent. Defecation in the next morning was as per routine. It is possible that effect on defecation can be seen after eating bread only though out the day. In the next series of experiments this fact was confirmed.

V) Daily routine manual work was not disturbed while eating bread. Thus one can conclude that bread is not harmful to healthy persons.

From the above study conclusion can be drawn that bread may be somewhat 'pittavāta Provocative'.

5.3.3) SARVAGRAHA METHOD :-

1) Methodology :-

Sarvagraha means eating only bread throughout the day.

Five healthy volunteers were given bread by this method. Advice was given to take bread with tea as much as he can. Whenever hunger is observed. Except water nothing was allowed throughout day. The experiment was carried out for three days continuously. Symptoms seen after eating the bread were recorded on a specific format. Special attention was given to group the symptoms according to time factor after eating the bread. Previous experience was accounted to decide possible total amount of bread to be required. Sufficient stock of bread including additional quota upto 25% was made available early in the morning. Recorded material was subjected to study.
**ii) Observations:**

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Time</th>
<th>Symptoms Seen</th>
<th>No of Persons</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1)</td>
<td>Upto 2 Hrs.</td>
<td>ALSAYA (lethargy)</td>
<td>1</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td></td>
<td>AMLIKI (acidic regurgitation)</td>
<td>1</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td></td>
<td>GAURAV (heaviness)</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td></td>
<td>JRUMBHA (Yawning)</td>
<td>4</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td></td>
<td>KANTHDHA (burning sensation throat)</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TRUPTI (Satisfaction)</td>
<td>5</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TRUSNA (Thirst)</td>
<td>5</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>JRODAHA (burning in Chest)</td>
<td>3</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td></td>
<td>UTSAYA (Vigour)</td>
<td>1</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ALSAYA (lethargy)</td>
<td>1</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td></td>
<td>AMLIKI (acidic regurgitation)</td>
<td>4</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td></td>
<td>GAURAV (heaviness)</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td></td>
<td>JRUMBHA (Yawning)</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td></td>
<td>KANTHDHA (burning in throat)</td>
<td>2</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MUTRADHA (burning micturation)</td>
<td>2</td>
<td>40</td>
</tr>
<tr>
<td>2)</td>
<td>2-4 Hrs</td>
<td>ALSAYA (lethargy)</td>
<td>1</td>
<td>20</td>
</tr>
</tbody>
</table>

**TABLE SHOWING SYMPTOMS SEEN AFTER EATING ONLY BREAD FOR SUCCESSIVE THREE DAYS. (SARVAGRAHA METHOD)**
<table>
<thead>
<tr>
<th>Sr. NO</th>
<th>Time</th>
<th>Symptoms seen</th>
<th>No of Persons</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Trusnā (Thirst)</td>
<td>5</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Udarādāha (burning in abdomen)</td>
<td>5</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Udarāsul (pain in abd)</td>
<td>2</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Udgār</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Utsāha (vigour)</td>
<td>1</td>
<td>20</td>
</tr>
<tr>
<td>3)</td>
<td>4-6 Hours</td>
<td>Trusnā (Thirst)</td>
<td>4</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dāha (burning)</td>
<td>2</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Šula (Pain)</td>
<td>1</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sleeplessness</td>
<td>5</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Swapna (dreams)</td>
<td>2</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Styān/alpapurīga (sticky &amp; small amount of stool)</td>
<td>5</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pravāhan (forceful defecation)</td>
<td>2</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Onset of hunger (Kshut)</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td></td>
<td>upto 3 hours</td>
<td>2</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3-4 hours</td>
<td>2</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4 Onwards</td>
<td>3</td>
<td>60</td>
</tr>
</tbody>
</table>
TABLE NO 11
TOTAL AMOUNT OF BREAD CONSUMED IN A DAY

<table>
<thead>
<tr>
<th>S.NO</th>
<th>Amount of Bread</th>
<th>No of Persons</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1)</td>
<td>600-650 Grams</td>
<td>2</td>
<td>40</td>
</tr>
<tr>
<td>2)</td>
<td>650-700 &quot;</td>
<td>1</td>
<td>20</td>
</tr>
<tr>
<td>3)</td>
<td>700-750 &quot;</td>
<td>2</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td>TOTAL</td>
<td>5</td>
<td>100</td>
</tr>
</tbody>
</table>

It is clear from the tables that

1) Immediate after eating bread Kshutśānti was seen.
2) Hunger was noted after 3.45 hours.
3) Meanwhile urovidāha, amlodgara, amlikā, truṣhnā, kanthadāha, udardāha & jrunbhā were seen.
4) On the second & third day of series intensity of the symptoms was increased. Kanthadāha, mutradāha udarsūla, sirsūla & bhrama were specially recorded.
5) On 2nd, 3rd & 4th day of the series there was constipation and difficulty in defecation. It was increased after 2nd day.
6) Sleeplessness was positively noted.
7) Daily manual was not so much disturbed.

Results & Discussions:

1) Bread is capable to provide kshutshānti. Hence
SYMPTOMS SEEN AFTER EATING BREAD

Abbreviations:
K - Kapha Prominency
P - Pitta Prominency
V - Vata Prominency

GRAPH NO. VI
it can be consumed safely in the form of diet.

ii) Next hunger was seen 3-4 hours after previous meal of bread. It indicates that bread is not too heavy for digestion. It can be digested earlier than full meal with capati etc.

iii) Symptoms of pittaprovocation are seen before two hours after eating. These are expected after two hours. Therefore it can be claimed that bread is pittaprovocative.

iv) Burning micturation was noted in study. This shows katuvipāka of bread.

v) Constipation, difficulty & forceful defecation, slight defecation all these denote vātāproperty & purīṣakshya (161 to 163). It indicates katuvipāka of bread. It is clear that bread donot form bulky stool, nor add in stool formation. On the otherhand it provokes vāta.

In previous ekānagagraha method no effect on stool was noted but in present sarvagraga method a definite effect on stool was noted. So it can be interpreted that if one has to find out vipaka of a recipe one should consume the same item at least for 2-3 successive days.
vi) Sleeplessness was positively noted which is a sign of vātāprovocation (164). Swapna (dream) were observed in some volunteers. The condition may be because of flatulence (adhman), Adhmanāis a sign of vātāprovocation (165).

vii) Siruṣula & bhrama shows vātāprovocation & dhātukshāta. It means dhātupushti is not seen. It indicates Katuvipāka of bread.

viii) Daily manual work was not disturbed so much. Therefore bread can be included as a part of diet as regular item.

From the above facts it reveals that bread is vātāpittpāprovocative in nature.

So the bread should not be consumed in the persons having either pittava-prakṛti or pittavātadisorders. If its use in unavoidable then it should be taken alongwith sweet, and oleative substances such as milk, butter, sugar, & ghee. As bread cannot be a complete diet it should be taken as supportive diet only. As bread is neither too heavy nor too light for digestion it can be eaten safely by a person of an average digestive capacity. Persons having tendency
for constipation should avoid bread eating as bread is a cause of constipation. If such persons take bread with ghee or butter or sour substances, such effect will be minimised. It will be interesting to know that in western countries butter is used with bread, phrases such as "bread & butter" are used in English literature. Use of butter a substance which is sweet, oleative minimises untoward Vātapitaprovocative properties of bread. Perhaps one may not be having proper reasoning. But they are using nothing but "Ayurvedic principle". Thus a practical application of this knowledge will be useful in present context.

5.4) BHĀUTIC ATTRIBUTES OF BREAD

( Dravya Parikshanam)

Each & every substance present in the universe is formed from the pānchmahabhūte. Each Mahābhūta is having certain attributes. Thus the combination of mahābhautic attributes of specific substance constitutes for apparent attributes of the substance. This is true when the combination of mahabhuta is in prakratisasāmasamavāya pattern. In the case when the pattern is prakratiśamsamāvāya, this is not true. In the case of recipes, this becomes more complicated, due to number of ingredients & processes required for the preparation. Bread being a recipe, it is difficult to denote exact Bhautic Constitution of bread. However, efforts in this concern may be done.
5.4.1) Rasa :-

There are six rasas in the universe. Each is prominent in two mahābhuta. When we see practically, bread is sweet with slight saline in taste. Anurasa is seems to be sour. Bhautic constitutency as per rasa will be as follows.

<table>
<thead>
<tr>
<th>Rasa</th>
<th>Mahābhuta</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Madhur (Sweet)</td>
<td>Prathvi</td>
</tr>
<tr>
<td>2) Lavana (Saline)</td>
<td>Āpa</td>
</tr>
<tr>
<td>3) Amla (Sour)</td>
<td>Teja</td>
</tr>
</tbody>
</table>

Total:-- Prathvi āpa teja.

5.4.2) Vipaka

Bread is having katuvipāka. Concerned mahabhutas are as follow.

<table>
<thead>
<tr>
<th>Vipāka</th>
<th>Mahābhuta</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Katu</td>
<td>Vāyu Tejas</td>
</tr>
</tbody>
</table>

5.4.3) Guna :-

Attributes of substances based on bhautic prominency are given by the texts. These are taken as guide lines.

In the following table, attributes of dravyas on bhautic prominency are shown. Those attributes present in bread are marked out.
<table>
<thead>
<tr>
<th>Dravya</th>
<th>Attributes</th>
<th>Presence in bread</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1) Parthiv</td>
<td>Guru (heavy) <strong>+</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Khara (rough) +</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Kathinys (hard) +</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Manda (dull) +</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sthira (stagnant) +</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Visada (non slimy) +</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sāndra (dense) +</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sthula (gross) +</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Gandha (smell) +</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Adhogati (downward displacement) +</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Madhur (Sweet) +</td>
<td></td>
</tr>
<tr>
<td>2) Āpya</td>
<td>Drava (liquid) +</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Snigdha (oleative) +</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Śita (cold) +</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Manda (dull) +</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mrudus (soft) +</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pinchāl (slimy) +</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Guru (heavy) +</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sara (fluid) +</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sāndra (dense) +</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Āmla lavana +</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td><strong>3) Tejas</strong></td>
<td>Ushna (hot)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tikshna (Sharp)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sukshma (subtle/minute)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Laghu (light)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ruksha (unctuous)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Khara (rough)</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Katu (pungent)</td>
<td></td>
</tr>
</tbody>
</table>

| 4) Vayaviya | Lajhu (light) | + |
| | Seet (cold) | + |
| | Ruksha (dry) | + |
| | Khara (rough) | + |
| | Sukshma (minute) |  |
| | Kasa[ṣya] (Astrignant) |  |

| 5) Asakiya | Mrudu (soft) | + |
| Akaśiya | Laghu (Light) | + |
| | Sukshma (minute) |  |
| | Ślakshna (smooth) |  |
| | Vivikta (saurus) | + |

From this table it is clear that attributes of all the mahābhutes are seen in the bread. However Pārthiv, Apya, Vayaviya & Akaśiya are prominent.
EXPERIMENTAL STUDY TO DECIDE PÅNCABHAUTIC CONSTITUTION OF BREAD:

Knowledge of pāñcabhautika constitution of a substance helps to decide its potential dosaprovocative/dosaannihilative property. Considering the views of texts regarding qualities of mahābhuta & dravyas described on bhautic dominance, an attempt is made to develop a method to decide pāñcabhautika dominance in a substance.

1) Microscopic Examination:

Physical gross nature of a substance can be seen by naked eye. Nature of minute particles & their combination pattern can be seen with the help of a microscope. Compactness or otherwise can be noted by this way. Keeping this in mind microscopic examination of bread was done. Biscuit was used just for comparision.

Fine particles of bread & biscuit were done with the help of a sharp knife by light scraping. One fine particle of bread was taken on one glass slide (3d) & that of biscuit was taken on another slide (Bt) slides were seen microscopically under lowpower (10x). The architecture of particles seen was noted. After noting the architecture one drop of water was dropped on these particles. Water was allowed to be mixed with particles with the help of a pin. A cover slip was kept on the slide. Then under low power characters of particles as observed are noted as follows.
Observation

i) Dry biscuit particles were seen scattered in the form of granules. Bread particles were seen as leafy network.

ii) In wet stage biscuit particles were seen individually clearly. They were away from each other. In moist stage bread particles network was not seen clearly. Moreover it was fused with other.

Discussion:

From the above observation it can be said that bread contains more porosity i.e. akasa bhuta than biscuit. Compactness in biscuit is more i.e. it may be relatively akastya in nature. The other cause for is & Kharapaka in the preparation of biscuit. By more contact of heat & consequent vaporisation of water khara paka takes place. Biscuit particles do not fuse with each other. When mixed with water whereas bread fused with each other. It means bread permits entry of water. Compared to biscuit the internal structure of the bread is softer. Individual particles of biscuit are so heated that they do not get moistened by water. This lack of moistness makes it to last undeteriorated longer than bread.

One can say that bread is ruksha in nature. It absorbs water. In the body bread may show such antikle-dana effect.
From this experiment it is possible to say that bread may be dry & soft in nature. Akasabhuta can be demonstrated in bread. However, its percentage is difficult to note. Mraud & khara attributes are seen respectively in bread and biscuit.

Experiment No 2 :-

To note the nature of porosity/compactness this experiment was carried out.

When a drop of liquid is allowed to be on a nonporous noncapillary surface of a substance it remains constant. It does not get through. If this drop is dropped on a porous surface it gets through it. This liquid reaches another surface. The time to pass through the substance & amount of liquid required is mainly directly related to the porosity, capillary of surface (substance) provided that liquid is the same. Thus it will be possible to understand compactness of a substance by this way. Keeping this in mind efforts are made. To estimate compactness non-porous, non capillary architecture of a substance is to estimate akasa components existence.

Bread and biscuit were taken as surface. Water & sesame oil were taken as liquids, pieces, of 1.5 cm length x1.0 cm width x00.5 cm thick, each of bread & biscuit were made with the help of a sharp knife. Small rounded pieces (9 cm diameter) of filter paper were taken. Two sets of bread/biscuits pieces & filter paper were made. One piece
of bread was kept on filter paper on one set & water was allowed on paper the second set sesame oil was dropped by a dropper. Then the filter paper beneath the bread was observed keenly. When these papers became wet or oily the time was noted. Thus these observations are made from 5 minutes to 30 days.

Observations :-

A) I set-(Water dropping)
1) After dropping one drop of water filter paper placed below the bread became wet within one or two minutes. There was no effect on the filter paper placed below the biscuit.
2) Bread & biscuit pieces each of 1x1.5x1 cm sizes were taken 2 drops of water were dropped, there was no effect on the paper placed beneath the biscuit. The paper was not much wet.
3) After dropping 20 drops of water on the pieces of 1cm thickness, the paper under bread became very much wet whereas there was no effect on the paper under biscuit. However upper portion of the biscuit became somewhat wet. But after 30 minutes paper under the biscuit became wet.

B) II set (Dropping of Oil)
In second set oil was used in place of water.
1) When one drop of oil was dropped on the both pieces there was no effect on both the papers upto 10 minutes.
2) Considering porous nature of bread its thickness was doubled. Whereas that of biscuit was kept as it is. Then 2 drops of oil were dropped on each specimen. Papers
under specimen were watched. After 25 minutes paper under bread became oily where as paper under biscuit remained as it is.

3) After 20 hours of dropping oil, bread became hard. Its size was some what increased. The paper under biscuit was also oily.

4) After 45 hours of dropping oil size of bread was not changed. But the size of the biscuit was increased biscuit was also oily.

5) After 90 hours biscuit became soft & oily, where as bread was totally dry.

6) After 18 days biscuit was soft & oily bread was hard and dry.

7) After 30 days biscuit was dry & its size was increased Bread was totally dry, with the same size.

DISCUSSIONS:

i) When water was dropped on bread piece it percolated to another side earlier. It shows that bread is more porous with capillary architecture, when more water was dropped bread became more wet viscous in nature. It shows that bread absorbs water. It may be dry in nature. It is also porous. Biscuit required more water to become wet. It shows that biscuit is more compact in nature than bread.

ii) When oil was dropped bread became oily. Then oil was passed over to filter paper placed beneath it. As a result bread became dry. This shows that there is little
obstruction in its way. This shows porosity of bread & less holding capacity.

Biscuit required more time to become oily & than to dry. This also shows that biscuit is more compact than bread.

iii) Size of biscuit was changed after dropping oil. It may be because that absorbing oil by it to holding it.

Biscuit has absorbed oil in more quantity and consequently release less quantity. Bread absorbed oil & gave up without holding it mostly all of it. Thus there is no positive remarkable change in bread size. The bread architecture permits oil or water to percolate. Hence this does not allow the permits oil or water to percolate. Hence this does not allow the chance for water ox or oil to be in contact for longer time. Since the permeability through biscuit is not easy the water or oil has longer contact with individual biscuit particles, engorging them. This engorgement together increases the size & softness. It is therefore, advisable to have oil when biscuit are consumed.

From this it is possible to say that bread is porous in nature. Ākāśabhuta can be demonstrated.

EXPERIMENT NO 3

Properties of the substance are described by the texts. These references are taken as guide lines. Accordingly substances prominent in prithvi and apa are heavy in nature and have property of downward displacement. (adhogati)
Substances prominent in Teja, vayu & akasa are light in nature & have property of upward displacement (urdhwagati) To verify this, weights of substances of equal volumes can be compared. Substances of parthiva & apya prominence may weigh heavier than vayaviya, Tejas & akasaya substances.

A container was tightly filled up with bread, biscuit, jawar roti & poli for this purpose bread, biscuit, jawar roti & poli were studied. To maintain equal volume, a plastic quadrangular transparent container was used. Its size was 2.5x6.5x9.5 cm. The total capacity was 154.315 cubic centimeters. The weight of the container alone with the lid was 21.500 gm. A scientific balance was used.

The container was tightly filled up with bread, biscuit, jawar roti & poli independently. Their weights were recorded. The above mentioned substances were dried in natural course of period under room condition. It was the month of Aug/Sept. 85 weather was not too hot nor too cold. Weights of all the items were noted at the end of the 1st week & 4th week.

**Observations:**

Original weights, weights after one week and four weeks of bread, biscuit, jawar roti and poli are tabulated in table NO 11.
### TABLE: No. 11

<table>
<thead>
<tr>
<th>Sr. NO</th>
<th>Particulars</th>
<th>Bread</th>
<th>Biscuit</th>
<th>Jawar roti</th>
<th>Polika</th>
</tr>
</thead>
<tbody>
<tr>
<td>1)</td>
<td>Original weights</td>
<td>55.950</td>
<td>75.960</td>
<td>124.370</td>
<td>100.070</td>
</tr>
<tr>
<td>2)</td>
<td>Wt. after One week</td>
<td>45.850</td>
<td>75.960</td>
<td>78.00</td>
<td>82.070</td>
</tr>
<tr>
<td>3)</td>
<td>Wt. after 4 weeks</td>
<td>39.990</td>
<td>75.960</td>
<td>77.200</td>
<td>82.600</td>
</tr>
<tr>
<td>4)</td>
<td>Loss of wt.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>after One week.</td>
<td>18%</td>
<td>NIL</td>
<td>37%</td>
<td>17%</td>
</tr>
<tr>
<td>5)</td>
<td>Total loss of Wt.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>after 4 weeks.</td>
<td>28.5%</td>
<td>NIL</td>
<td>37.9%</td>
<td>17.4%</td>
</tr>
</tbody>
</table>

DISCUSSIONS:

1) Weights of fresh samples show that bread/biscuit, polika & jawar roti are more compact in descending order. Bread is the lighter one.

2) At the end of 1st week reduction in weight of bread, polika, & jawar roti was seen. There was no reduction in weight of biscuit. Reduction in weight is likely to be due to evaporation of water contents. In the case of polika & bread rate of evaporation is more or less equal. In the case of jawar roti it was highest whereas biscuit has no evaporation. Among these four, perhaps biscuit contains less apya substances whereas jawar roti contains maximum. Thus biscuit is dry in nature compared to other three. Here one can say that biscuit may be vaporovocative by this quality(attributes).
3) At the end of 4th weeks there was no loss of wt. in biscuit. Highest loss was seen in jawar roti. Rate for polika was same (i.e. 1st week) in the bread, it was increased.

4) Biscuit maintains its weight after 21 weeks. It shows that it contains minimum water. It is heavier compared to other 3 polika maintains 82.6% wt. It shows it contains 17.4% evaporable water. It is heavier compared to biscuit & jawar roti.

Jawar roti maintains 62.1% weight losses 37.9% wt. It shows that it contains more water compared to other 3 again it shows that roti is heavier than other 3.

Bread maintains 71.5% wt. & losses 28.5% wt. It means bread contains evaporable water upto a massive range. This may cause kledkar action in the body.

Thus, such a this study may with permutation & combination may lead to find out individual bhautic constitution of a substance. But at present it is difficult to conclude so, however, this may give a clue to a scholar for further work.

Experiment NO 4

Effect of kala on bread was studied. In due course of time the nature of substance gets changed. This change depends upon the pāncabhautic constitution of the substance. Bread & biscuit were subjected to this test.
Bread 20 gm & biscuit 20 gm. were taken. They were kept open in room for one month in August 85. The colour, odour, & nature of each specimen were recorded at the beginning & after one month.

**Observations:**

At the beginning bread specimen was whitish, smooth, with slight acidic odour. Biscuit specimen was brown in colour, hard & with no specific odour.

After one month there was no change in colour, odour & nature of biscuit. There was definite change in the colour odour & nature of bread. Bread become light, dry, hard, with more acidic odour. There was some yellowish green fungus on the some part of the bread.

**Discussions:**

1) Change in bread is due to kalapaka.

After evaporation of water from bread, it became light hard & dry in nature. Growth of fungus shows that there was definite water contents in the bread.

Biscuit shows no change. It means it contains less water.

2) As fungus growth is there, bread seems to be mradup-aki & biscuit kharpaki.

From the above all experiments one may conclude that bread is dry, light, & porous in nature. Its water contents can be practically demonstrated. Its weight shows parthiv
contents. However, their proportion is difficult to determine. One can judge it approximately. Perhaps this study may be useful to coming scholars to look in this matter. Further experiments can be avoided. Thus, possible guidelines will be available here.

5.4.5)

To concise the bhautic attributes of bread, certain facts are to be considered. As per rasa concept bread is prominent in prithvi & apa. As per guna concept it is also prominent in prithvi & apa along with some part of vayu & akasa. There is a little quantity of Teja mahabhuta in it. If ingredients such as wheat flour, salt & water are considered bread is mostly partiva & apya in nature. Contact with yeast, a fermentative agent & heat indicates tejas guna of bread. If we see physical nature of bread, it is puroos one which shows the ākāsiya nature bread. Further if we compare the weight of bread with other recipes such as roti, capati, biscuit, bread is definitely lighter than them. No doubt, that wheat flour is heavy, but after processes of preparations such as fermentation & baking in oven, the original nature of the ingredients may be changed upto a limit. It is possible that pārthiva & āpya nature is minimised. While as vāyaviya & ākāsiya nature is increased.

Second possibility is that process such as fermentation & roasting in (oven) may be adding Teja, guna in it.
Because of the interaction of Teja, apa & prithiv there may be change which lead bread to be lighter one. Geja sanskara also play an important role in the case of bread. In clinical study, it was seen that bread shows pitta prominent symptoms. In short one may say that as per ingredients considered bread is pārthiv & apya in nature. After process Tejas, vāyaviya & ṛkāsiya contents are increased in it.

Yeast being one of the ingredients, combination, pattern in bread may be called as 'prakrutisamasamavya' i.e. as per the ingredients. Parthiva & apya contents from bread cause Kshutasanti, burning sensation is due to Teja bhuta, constipation is due to vayubh uta.

These bhautic attributes & constitution may help to decide dosictendency of the bread when taken regularly & in excess. It may cause pitta vata provocation. When we say that a (Certain) substance is dosaprovocative it means it is result of comparative study. Bread is pittavāta provo-
cative than the capāti, which is prepared from wheat flour, an ingredient, of bread. One may quote another example, of odana & peya. Both are prepared from rice. But peya is lighter than rice. Here rice is heavy. But if compared to wheat capati, the odan is definitely lighter. Therefore one should be alert while labelling an item as dosaprovoc-
itive or otherwise.

I hope that, this study will be helpful to look-
-after these points. Further, experimental pattern may be evolved. The possible guidelines will be available here.
To summarise, I wish to point out that these efforts are based on the method suggested by classical texts and the commentaries thereon. I will like to quote the SM commentary by Cakrapāṇidatta on Susruta Samhita & Caraka Samhita. In Bhānumati commentary on Susruta Sutrasthān 46-332, he mentioned clearly a specific format to understand the properties of the non-mentioned recipes. He suggested that the attributes of such recipes can be judged by three ways: (i) Pratyakṣa partial weightage should be given to the actual examination by the scholar. (ii) Upayok-travacantah partial weightage should be given to the opinion of the persons (Āyurvedic or non-Āyurvedic) using that recipe. (iii) Upayogatāh partial weightage is to be given to the observations & inferences drawn by the scholar after safe utilisation of recipe.
In Āyurveda dipika commentary on Caraksutrasāstāna 27-329/330. The same view is mentioned (167). He remarks that attributes of classically non-mentioned recipes can be partially judged Āyurvedically by reviewing the opinion of the persons using that recipe & the practical use of it. (deśantāravācā & vyawahāra). Further one may deduce gana (category) of that item based on attributes If one knows the gana general properties, can be understood. Group identity can be communicated to the scholars & professionals of discipline e.g. groundnut is not described in texts but used abundantly at present, oil is extracted from it. So the properties of this oil will be considered as per general telavarga given in text i.e. oleative, hot, vātāannihilative, pittaprovocative etc. The present work is practically based on this format.

(167) आन्तर्विषेण प्रक्षेति: आन्तर्विषेण प्रक्षेति: त
dravyam नं च निर्देशद्वृत्त शास्त्र: कार्तिक्य नामभिः: त
yadh naśāyāya vāpitum daksāyana vahō yadh: t
dravyam tattvād tatha vādāmya ānuktaṃ bhāgabhāgo tā
g. 26/329, 330
आयुर्विद्विदिमाण्डिका टिका:— तद् प्रतिपद्यते पद्मरथवामत्वाद्
प्राचीन्य पृथिवियायस्य कारणमिति प्रायोगिकार्थादात्ताम् मृत्युविद्याकारणमिति
karmāda prakāśa vartayate tād vatsa vyāyāmāt varma
dravyam vartayate tād vatsa vyāyāmāt varma
1) Pratyaksha:-

Efforts are made to have bhutaguna parikshā & rasaparikshā. (Page NO 96) The possible Pancabhaautic nature is prominent in apya agneya & akasiya porition.

ii) Anumāna:-

Accounting the contents & their properties (Ārambhak dravyāni) attributes of a recipe are detected partially. Partial weightage is given to the processes (Samskara) envolved in the preparations. Because perhaps there may be change in basic properties due to processes Bread is prepared mainly from wheat flōur. Dough is ūrmenated with the help of yeast. Which is an agneya Samiskāra & is parallel to the amlaprapāka of natural course of digestion. Baking in oven is again an agnismaskāra. The bread is sweet, with acidic smell & āgneya in nature. It may provocate vātapitta.

3) Upayogatāh:

Bread was used personally & by healthy volunteers for a definite period in a definite quantity. Effect was recor-ded. It shows that bread is having pittavata provocative attributes. (Page NO 79).

4) Upayoktravacantah:-

Bread is originally from western countries. Therefore desāntar vacā & vyawahāra is accounted. In the text *principles & practice of medicine by Davidson,* there is an advice to avoid bread in dyspepsia & allied conditions.
Practically these conditions include pitta disorders. However, he is in opinion that bread may be consumed with sugar & butter. Ayurvedically avoidance of bread in dyspepsia indicates pitta attributes of bread & consumption of sugar & butter is to minimise pittaproyocation, Because sugar & butter are sweet & deative in nature, respectively. Opinion of the davidson exactly correlates the Ayurvedic approach.

5) **Ganadnyan:**

Bread is prepared from wheat flour, Hence it is Krattānna of Āamidhānyya Sub-group in Krattānna varga can be deduced considering processes & properties. Prolong contact with water & addition of yeast indicates fermentation. This is rarely used in classical recipes except Kundalini & Salipupa. Kundalini is prepared from wheat dough & salipupa from rice dough. Both are deep fried in ghee, served with sugar, Kundalini is immersed in sugar syrup & salipupa contains sugar as a content. Therefore both do not provoke pittavāta other, hand bread is not mixed with sugar non-served with sugar. Hence, it requires separate indentification. Em Em

In classical age fermentation process is used in asava preparation which are liquids. Bread is not a liquid so identity based on fermentation cannot be concluded.

Agnisamskāra may be thought for the purpose. Certain
words are used in astangsamigraha for agniśamskara. These are kukul, Kharpar, bhastra, kandu & angar. To know exact linguistic & technical meaning a review of sanskrit vācasp- atyam, Āyurveda viśwakośa, Āyurveda mahākośa, Sanskrit English Dictionary by Apte, & molesworth Marathi English, Dictionary and sohoni's English Marāthi dictionary was taken. The words used in daily practice by an average person were also accounted.

i) Kukul:- As per Cakradatta it is an aganisamiskara with the help of cowdung. According to in a & aruna it is steam heat. In Apte Dictionary meaning is Chaft, a hole

ii) Kharpar:- It is a rough cheat (Apte) a flattened pot with a open surface (Āyur.Mahākośa)

iii) Bhrāstra:- Kharpar (A.Mahākośa), a frying pan with holes (hemadri) frying pan (apte)

iv) Kandu:- concave sheet for deep frying (hemādri & A.Mahākośa) oven (apte) swedan & bharjan patra (Smruti)

There is a kanduyantra described in Ayurveda viśwakośa in which recipes is cooked by steam.

v) Angār:- Charcol containing device( hemādri) charcoal (apte)

vi) Bharjani:- Word used by leyman, it means toasting roasting.
BAKERY GANA

SUBGROUP - A

GLUCOSE BISCUITS

ORANGE BISCUITS

KAKE
BAKERY GANA

SUBGROUP 4B

TOAST

KHARI

SAMOSA

(6)
BAKERY GANA
SUBGROUP B3

PLAIN BREAD

MILK BREAD
Considering these aspects of meaning it is bit difficult to include bread in one of them. Angar is used but it is in closed compartment as Kandu, Yantra, Texts presume agar in open air. In kanduyantra steam is used. Inbhrāṣtri there is deep frying pan Tray is used for roasting bread. But baking is in closed compartment. Which is not expected in bhrāṣtri by texts. Thus, it will be better to use the word bakery which is in practice by an average person. The linguistic meaning (Yogārtha) of the word bake is to cook or be cooked by dry heat, make hard by heating. Bakery is the place where bread is baked or sold. (Sohani) The word Bakery itself indicates by rudartha a sort of fermentation & roasting/baking in a closed compartment/overn etc. So it will be better to give nomenclature as bakery gana'. It may be subdivided in two groups.

A) One with Sugar, cream etc. i.e. biscuit cakes.

B) Second without Sugar, i.e. bread Pava, samosa toaste etc.

Sub. group containing sugar, cream, may not provoke vataapitta. Thus, this gana identity may help professionals to advise diet pattern in patients & healthy persons.

5.6) Sastradosanivāranam:

The texts has mentioned mostly used & popularly & known recipes of their age. So non-mentioned of unknown occasionally used items was a alpadosa of text. ( a little
And to solve the problem, anumānavidhi was given. But at present bread is popular and well-known irrespective of age, sex, religion, region, socio-economic status. It is also widely used. Hence its non-mention in text becomes prabhutadosa (major shortcomings). Hence it is highly required to mention bread in texts to minimise/remove this this shortcomings. I hope present work will minimise the Sastradosa & will make the science up-to-date in time context. (Yuganurupa) as per expectation & motto of science.