

STUDY OF AMINO ACIDS IN TRADITIONALLY FERMENTED ALCOHOLIC BEVERAGES USED BY BODO TRIBE

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Abstract: Study of amino acids was done in traditionally fermented alcoholic beverages of Banana, Jackfruit, Ranjit rice and Bora Rice used by Bodo tribe of Kokrajhar District of Assam, NE India. Total of 17 different amino acids were found which was analysed by Ultra Performance Liquid Chromatography. Both essential and non-essential amino acids were available in all the samples in varying amounts. The presence of amino acids has an important effect on the taste of products.

IndexTerm: Bodo, Ranjit Rice, Bora Rice, Amino Acids, Kokrajhar.

I. INTRODUCTION

Fermentation is one of the oldest methods for producing and preserving foods and it was started with indigenous knowledge since time immemorial. The process of preparing alcoholic beverages and their consumption is one of the oldest activities of mankind (1). Fermented foods and beverages can also have the value of enhancing flavours, increased digestibility, improving nutritional value and pharmacological values. Apple, kiwifruit, jujube, peach and litchi wine have been used in China in recent years. With the improvement of living standards, people have put more attention to the health care attribute of fruit wine. For two or more composite fruit wine brewing, probably endow a variety of fruit flavour, making wine more nutritive and palatable, and have good healthcare function (1). Various ethnic tribes of North East India consume rice beer on a regular basis in different forms and is believed to possess many therapeutic and medicinal properties (3). Consumption of fermented products like rice beer and other fruit beverages like that of star fruit, banana, jackfruit, gooseberry etc. are common practice of Bodo people of North East India. Bodo community has their own traditional techniques for production of alcohol using different substrate. The preparations of rice beer are very simple and contain a few distinct steps. Different fruits like banana, jackfruit, apple, star fruits and various types of rice are used in fermentation process in production of alcoholic beverages. Bodo tribe use their unique traditionally prepared starter yeast cake, which is called Amao. Amao is prepared by different plant ingredients in addition to little amount of previously prepared starter cake. Amino acids are the building blocks of protein. Both sticky and non-sticky rice varieties are being used in rice beer production. Fruits like banana, jackfruit, apple, star fruit etc. have been seen in the production of fermented beers. The presence of amino acids shows the presence of low molecular weight peptides in the rice beer, with bioactive and sensory active properties as described by Han and Xu (14). Proline is the predominant amino acid in the samples and has been mentioned as the main amino acid found in wines by Ough (12). Siebert, K.J. described the proteins rich in proline are responsible for producing haziness in beers by combination with polyphenols (13).

The products both beer and distilled beer are unique in taste as compared to commercial products. The fermentation process generally depends on amount of addition of starter cake and metabolic activities at room temperature. The potential benefits of these products can be explored after studying all the biochemical and microbial presence. The amino acids which are present take leading role in taste, aroma, and other activities (3).

II. MATERIALS AND METHODS

Two varieties of rice Ranjit and Bora, non-sticky and sticky respectively and two completely ripen fruits of banana and jackfruits were brought in laboratory and processed for fermentation. Beers are collected and kept in fridge at 4 degree centigrade till analysis process. To 1ml of the sample, 4ml of methanol was added and incubated overnight at -20° C. After overnight incubation sample was centrifuged and the supernatant was taken for evaporation. Evaporated sample completely under N₂ gas at 60°C using dry bath. To this 80 µL of Borate buffer, 20 µL of Accq Tag ultra reagent was added and incubated for 10mins at 55° C. After incubation 1 µL is injected into UPLC (WATERS Acquity-make) instrument, which is quantified using a WATERS standard. The mobile phases used were buffer A (Accq Tag Ultra eluent A1) and buffer B (Accq Tag Ultra eluent B). The identification and quantification of amino acids were worked out by comparing the retention times and peak areas of standard.

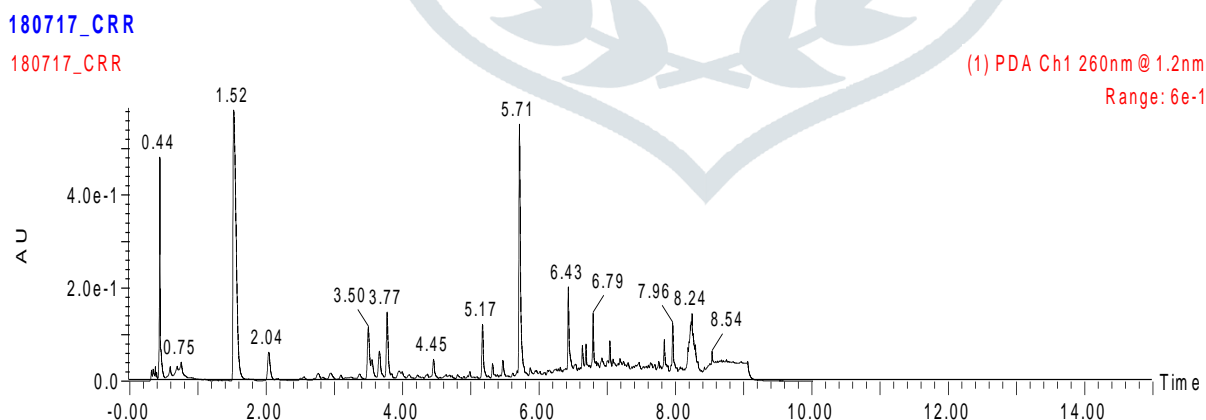
III. RESULT AND DISCUSSION

The amino acids in all the four samples were detected in UPLC-Waters. Amino acids were identified and calculated with retention time and peak areas. Essential, non-essential and conventional amino acids were identified in all the four samples. Essential amino which can be obtained from any ingested food staffs like histidine, threonine, lysine, methionine valine, isoleucine, leucine, phenylalanine were present in all the samples. Non-essential amino acids serine, aspartic acid, glycine, asparagine, proline, arginine, glutamic acid were present in all four samples of the study as shown in figure 6. Proline appears to be the most abundant amino acid in three samples viz. RR-Ranjit Rice, MR-Maibra Rice and JF-Jackfruit; except BF-Banana fruit product. Amino acids profile of all the samples are presented in table 1. The present study shows high amount of amino acids in the samples and good source of nutrients for health. Various studies on alcoholic beverages shows high amount of amino acids content. In the results proline is the predominant amino acid. Chromatogram for all the samples RR, MR, BF and JF are shown in figure 1, figure 2, figure 3 and figure 4 respectively.

Table : 1 The table shows the amount of Amino acids detected in the UPLC.

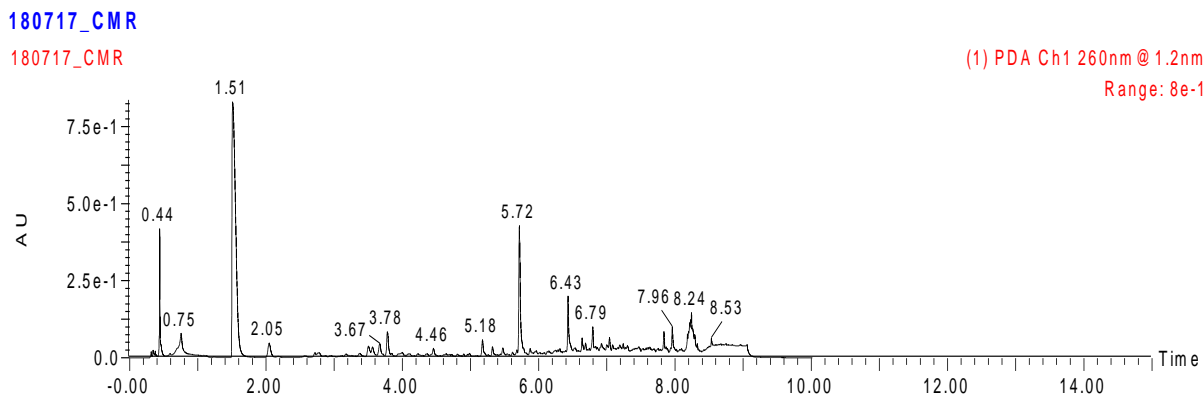
Sample:		RR	MR	BF	JF
SI No	Name	mg/L	mg/L	mg/L	mg/L
1	Histidine	187.5891	148.3564	3160.264	1873.51
2	Serine	156.3748	156.9542	465.3708	1849.629
3	Arginine	914.668	710.9008	1136.285	5987.737
4	Glycine	502.983	342.3287	979.6589	2070.94
5	Aspartic acid	227.6405	221.2275	737.7694	476.5463
6	Glutamic acid	721.0099	491.5515	542.1519	829.3255
7	Threonine	85.14623	109.6845	1376.519	2237.125
8	Alanine	1035.691	505.3958	1459.059	2732.96
9	Proline	6421.041	4896.322	1200.289	12660.49
10	Cysteine	67.08173	52.45325	108.7923	315.2389
11	Lysine	388.0963	333.4489	422.9091	424.3751
12	Tyrosine	1126.645	711.3692	662.4976	2692.209
13	Methionine	205.5609	217.129	639.8149	662.5496
14	Valine	594.4962	487.3287	3135.963	3758.917
15	Isoleucine	168.8892	151.677	555.8397	834.4599
16	Leucine	652.7471	556.3659	2028.089	2020.015
17	Phenylalanine	1229.602	997.7828	2116.435	3777.415

Figure:1 Chromatogram for sample RR:



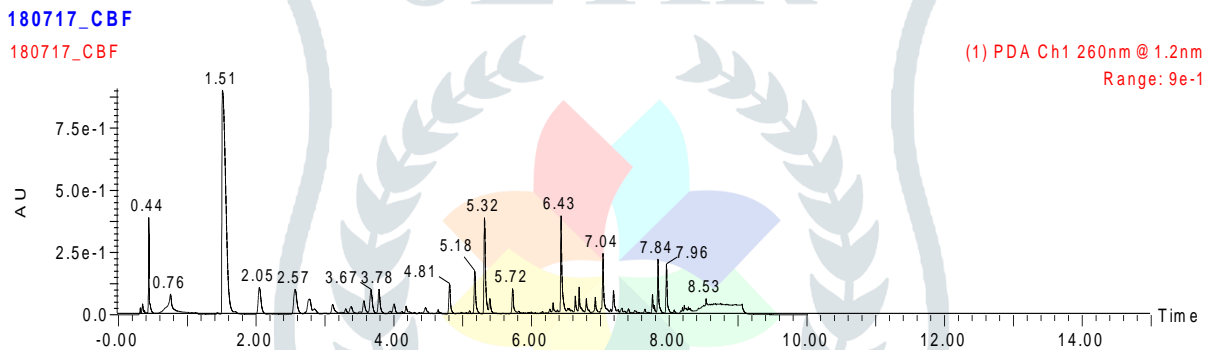
The sample RR denotes Ranjit Rice. Phenylalanine is maximum quantity and Cysteine is minimum quantity in fermented beer of Ranjit rice.

Figure:2 Chromatogram for sample MR



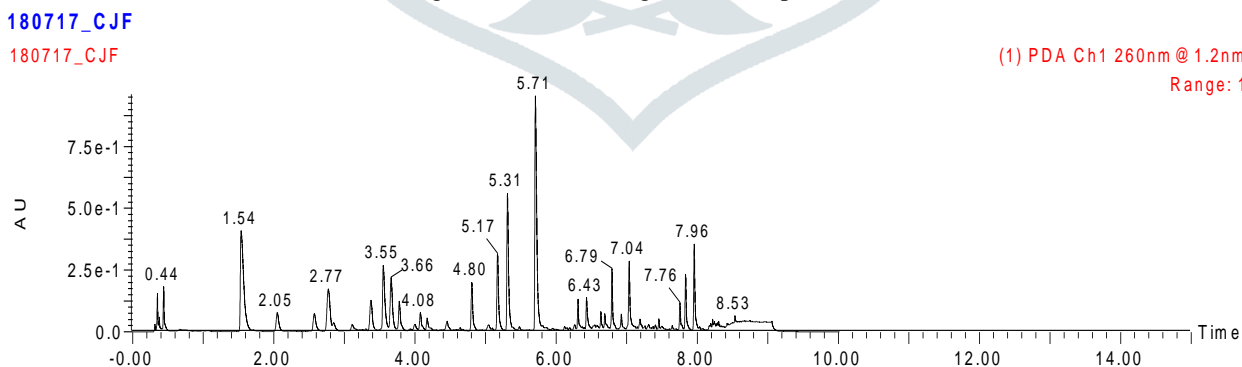
The sample MR denotes Maibra Rice. Proline is maximum quantity and Cysteine is minimum quantity in fermented beer of Maibra rice.

Figure:3 Chromatogram for sample BF



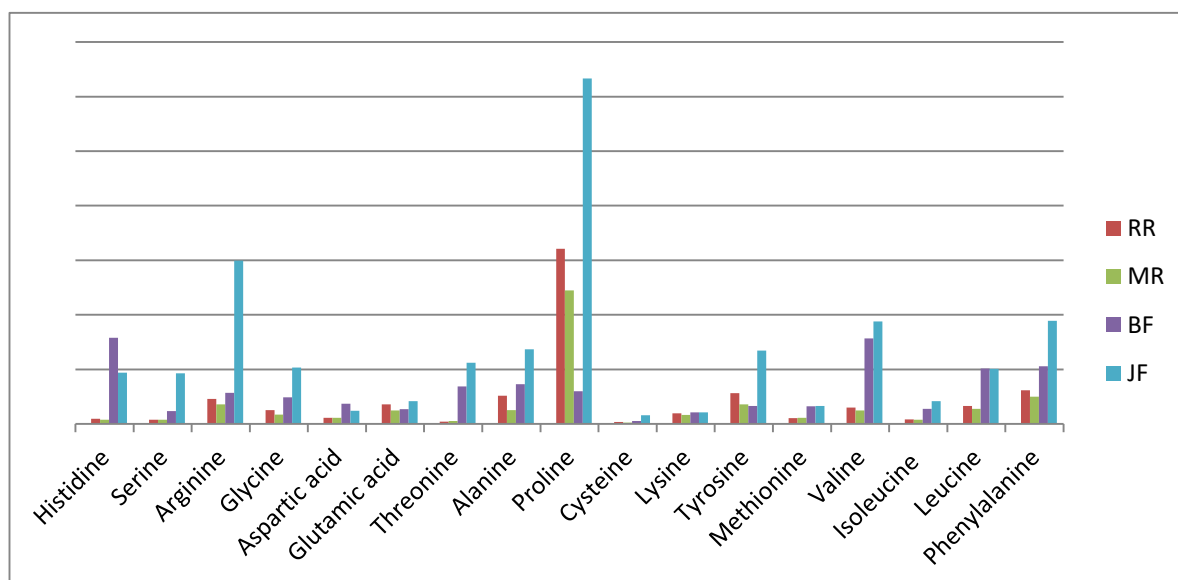
The sample BF denotes Banana Fruit. Histidine is maximum quantity and Cysteine is minimum quantity in the sample.

Figure : 4 Chromatogram for sample JF



The sample JF denotes Jackfruit. Proline is maximum and Cysteine is minimum quantity in the sample.

Figure 6 : Graph shows the different amino acids quantity in all four samples.



The amino acids are building blocks of protein, so sufficient amount of amino acid is required in human body to carry out different essential metabolic and other house keeping functions. Amino acids are important both as essential components of proteins and for their roles in metabolism, neurotransmission, and lipid transport. In wine taste and sweetness of products are the mainly influenced by amino acids. Proline, serine, glycine, alanine, histidine and leucine helps in sweetness (3). Specially proline helps in sweetness and bitterness and also responsible for complexity of wine in nutritional context. (3). The amino acids context is found high in the present study which signifies a good source of essential nutrients and energy for the body (1). Free amino acids present in wort are metabolized by yeast during fermentation and are involved in biosynthetic pathways that lead to formation of important flavour components such as higher alcohols, esters, and sulfur compounds (15). Proline is also responsible for haziness of the beers (1). Amino acids are precursor for aroma compounds and directly contribute to the flavour of wines. Amino acids may be responsible for freshness, sweetness, bitterness or astringent which brings rice wines a rich taste and enables the wines to be mellow, rich, soft, smooth, harmonious, multi fragrant (16). Amino acids also have direct influence on the aromatic composition of wines (17). Figure 6 represents the result of the data.

IV. CONCLUSION:

The study shows the overall amino acid study of four different alcoholic beverages used by Bodo tribe which were prepared traditionally. It gives valuable information about the products. Both essential and non-essential amino acids were available in the beverages. Study provides useful information about the amino acid contents in the samples.

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