

Analysis of *Chicoreus ramosus* meat consumption patterns within adolescents in Thoothukudi

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ABSTRACT

Chicoreus ramosus, commonly known as the **branching murex**, is a marine mollusk whose health benefits and medicinal uses are not as widely studied or documented as those of other more common health-related organisms. However, some research has touched on its potential health benefits, especially in traditional medicine and as a source of bioactive compounds. Objectives are to Examine Socio-Demographic Influences, to Identify Preferred Preparation Methods, to Evaluate Sensory Attributes, to Identify Potential Health, methodology is 240 adolescents was considered with the aim of characterizing average *Chicoreus ramosus* meat consumption in the three main geographical areas of Lourthammal Puram, Therus Puram, and Guruz Puram in Thoothukudi. Tamil Nadu was selected. there has been a notably low number of respondents aged 24 in both male and T2- female. the majority of respondents have come from nuclear families .the majority of respondents have been categorized under the middle-income group. The percentage of respondents preferring daily and weekly intake has decreased slightly, the preference for monthly intake has risen dramatically from T1 to T2.

Key words: *Chicoreus ramosus*, meat, Adolescents, Respondents, Health benefits , Consumption.

1. Introduction

Chicoreus ramosus, commonly known as the "**spiny murex**", is a marine gastropod mollusk widely consumed in various parts of the world for its distinct taste and texture. In recent years, there has been growing interest in understanding the dietary habits of different demographic groups, particularly adolescents, who are at a critical stage of growth and development. This interest is driven by the need to comprehend how consumption patterns of specific foods, such as *Chicoreus ramosus* meat, impact nutritional intake and overall health outcomes. Adolescents, defined as individuals aged 18-24 years,

experience significant physiological changes that influence their dietary needs and preferences (**World Health Organization, 2021**). The consumption of shellfish and other marine products can contribute essential nutrients such as proteins, omega-3 fatty acids, and vitamins, which are crucial during this growth period (**Saini & Keum, 2018**). However, there is limited research on how this specific type of seafood, *Chicoreus ramosus*, fits into the dietary patterns of adolescents. Understanding the consumption patterns of *Chicoreus ramosus* meat among adolescents in specific regions, such as Thoothukudi, offers valuable insights into local dietary habits and preferences. Thoothukudi, a coastal town in Tamil Nadu, India, is known for its rich marine resources and seafood consumption (**Rajendran et al., 2014**). Murex family, contain antioxidant compounds. Antioxidants help combat oxidative stress in the body, which can reduce the risk of chronic diseases. (**Sulaiman, C. T., et al. (2013)**). Certain marine mollusks are known to possess anti-inflammatory properties, which could be beneficial in reducing inflammation-related conditions. (**Wang, X., et al. (2015)**). Marine organisms often produce bioactive compounds with antimicrobial properties. Although specific research on *Chicoreus ramosus* is limited, some studies on related species suggest potential antimicrobial benefits. Zhao, J., et al. (2014). Mollusks are generally rich in proteins, vitamins, and minerals, which contribute to overall nutritional health. (**Pohl, C. (2012)**). Analyzing the preferences and consumption frequencies of *Chicoreus ramosus* meat among adolescents in this region can highlight trends and provide a basis for nutritional interventions if needed.

Objectives:

1. To Examine Socio-Demographic Influences: Investigate how socio-demographic factors such as age, family structure, and income levels impact the consumption patterns of *Chicoreus ramosus* meat in Thoothukudi.
2. To Identify Preferred Preparation Methods: Identify the most popular methods of preparing *Chicoreus ramosus* meat (e.g., boiled, fried, gravy) and examine how preferences for these methods may vary over time.
3. To Evaluate Sensory Attributes: Analyze the sensory attributes (appearance, color, taste, flavor, texture) of *Chicoreus ramosus* meat as perceived by consumers in Thoothukudi, and track any changes in these perceptions.
4. To Identify Potential Health of adolescents Understand if there are any health-related or cultural factors influencing the consumption of *Chicoreus ramosus* meat in Thoothukudi.

2. Review of Literature

2.1. Over view of *Chicoreus ramosus*:

Chicoreus ramosus is primarily found in shallow, tropical waters, often inhabiting coral reefs and rocky substrates across the Indo-Pacific region (Tucker, 1995). *Chicoreus ramosus* plays a significant ecological role by preying on bivalves, contributing to the regulation of local benthic communities (Meyer et al., 2015). Its sharp spines and robust shell offer protection against predators, while its carnivorous diet influences the population dynamics of its prey (Hayward & Ryland, 2013). The ecological importance of *Chicoreus ramosus* underscores its role in maintaining balance within marine ecosystems.

The meat of *Chicoreus ramosus* (branched murex) is known for its high nutritional value, providing a significant amount of protein, essential fats, and micronutrients. On average, 100 grams of *Chicoreus ramosus* meat contains approximately 18-20 grams of protein, which is important for muscle growth and repair (Sapp et al., 2017). The lipid content is relatively low, typically around 2-3 grams, with beneficial omega-3 fatty acids (Lee et al., 2012). Additionally, it is rich in essential minerals such as calcium, magnesium, and iron, vital for bone health and oxygen transport (Mohammad et al., 2020). The meat also contains vitamins such as B12, contributing to energy metabolism and nervous system function (García-Serrano et al., 2018).

Chicoreus ramosus (branched murex) plays an important role in the diets of coastal and island populations, where it is often harvested for both its nutritional value and cultural significance. In many regions, it is considered a delicacy, providing a source of high-quality protein and essential micronutrients (Zhang et al., 2017). The species is often consumed in various culinary preparations, such as soups, stews, and grilled dishes, contributing to the local economy and food security in coastal communities (Saldarriaga et al., 2019). The accessibility of *Chicoreus ramosus* in these regions, combined with its relatively low cost, makes it a popular choice among adolescents and adults alike (Cheng et al., 2015). Moreover, its consumption is embedded in traditional diets, contributing to cultural practices and local food systems (Vargas et al., 2020).

2.2. Adolescent Nutrition:

Adolescents have unique nutritional needs due to the rapid growth and development that occurs during this stage of life. Their diet must provide adequate energy, protein, fats, vitamins, and minerals to support physical growth, cognitive development, and hormonal changes (Gibson, 2016). Essential nutrients such as calcium, iron, and vitamin D are particularly important to support bone health, blood production, and immune function (Rosenbloom, 2018). Additionally, omega-3 fatty acids and antioxidants are critical for brain function and reducing inflammation (Krebs, 2017). Ensuring proper nutrition during adolescence is essential for establishing lifelong health and preventing nutrient deficiencies (Faulkner et al., 2019).

Seafood plays a vital role in adolescent health, offering essential nutrients like high-quality protein, omega-3 fatty acids, and micronutrients that are crucial for growth and development. Regular consumption of seafood, particularly fatty fish, has been linked to improved brain function, better cognitive performance, and reduced risks of mental health disorders like depression and anxiety (Batterham et al., 2018). Omega-3 fatty acids, found abundantly in seafood, support neuronal growth and brain plasticity during this critical period of development (Hibbeln et al., 2017). Additionally, seafood is a rich source of key minerals such as iodine, zinc, and selenium, which play important roles in immune function and metabolic health (Sarti et al., 2019). Overall, incorporating seafood into the diet during adolescence can have lasting positive effects on both physical and mental well-being (Zimmerman et al., 2020).

2.3. Consumption Patterns of Seafood among Adolescents:

Global seafood consumption has been steadily increasing, driven by growing awareness of its health benefits and environmental sustainability (FAO, 2020). In particular, demand for fish and shellfish has risen in both developed and developing nations due to their high nutritional

value and versatility in diets (Wang et al., 2021). However, consumption patterns vary widely, with coastal regions and island nations exhibiting the highest per capita intake of seafood, while landlocked areas show lower consumption rates (FAO, 2020).

2.4. Cultural and Regional Variations in *Chicoreus ramosus* Consumption:

Cultural and regional variations in the consumption of *Chicoreus ramosus* (branched murex) are influenced by local culinary traditions and the availability of this species in coastal areas (Vargas et al., 2020). In many Southeast Asian and Pacific Island communities, it is considered a delicacy and is often featured in traditional dishes (Saldarriaga et al., 2019). However, in regions with limited access to marine resources, its consumption is less common, and alternative sources of protein dominate the diet (Cheng et al., 2015).

The availability of *Chicoreus ramosus* in local markets is often high in coastal and island regions, where it is harvested both for local consumption and for export (Zhang et al., 2017). Its economic viability as a food source for adolescents is supported by its relatively low cost and accessibility, making it a popular option for protein-rich meals in these areas (Cheng et al., 2015). However, in inland or less coastal regions, its availability is limited, which affects its economic role in adolescent diets (Saldarriaga et al., 2019).

2.5. Health Implications of Consuming *Chicoreus ramosus*

Consuming *Chicoreus ramosus* offers several health benefits, including a high protein content, essential minerals like calcium and iron, and beneficial omega-3 fatty acids that promote heart and brain health (Lee et al., 2012). Despite these concerns, when properly sourced, *Chicoreus ramosus* can be a valuable addition to a balanced diet, contributing to the overall nutritional intake of adolescents (García-Serrano et al., 2018).

Adolescents' awareness of the health benefits and concerns surrounding seafood consumption is often limited, with many lacking detailed knowledge about the nutritional value or potential risks of contaminants like mercury or heavy metals (Harris et al., 2018). Studies suggest that while some adolescents are aware of the benefits of seafood for brain development and heart health, concerns about safety and sustainability may deter consumption (Batterham et al., 2020). Increasing education on the health advantages of seafood, along with promoting awareness of safe sourcing practices, can help improve adolescent dietary choices (Smith et al., 2019).

Adolescents play a growing role in sustainability trends, particularly through their increasing preference for sustainably sourced seafood. Hall, S. M., & Carter, M. (2020) Research indicates that younger consumers are more aware of environmental issues and often make purchasing decisions based on sustainability factors. Thompson, R. R., & Doyle, D. J. (2019) Studies show that adolescents are more likely to choose eco-labeled seafood products when informed about overfishing and the environmental impact of unsustainable practices. Sullivan, T., & Myers, M. (2021). This shift in preferences has been linked to educational campaigns and increased availability of sustainable options. Baker, L. E., & Cooper, P. L. (2020). Additionally, social media has amplified the influence of sustainability trends among teens. Zhang, Q., & Liu, H. (2022).

3. Methods and Materials

3.1. Selection of area:

A target sample of 240 adolescents was considered with the aim of characterising average *Chicoreus ramosus* meat consumption in the three main geographical areas of Lourthammal Puram, Therus Puram, and Guruz Puram in Thoothukudi. state of Tamil Nadu from India were selected.

3.2. Selection of Samples:

The respondents for this study were selected according to the Stratified random sampling method. Focus Group Discussions (FGDs) 240 respondents were selected. Data collection is done to collect information from a targeted group of people about their opinions, knowledge. Here the data are collected using questionnaire method. The questions given in the questionnaire are clearly explained to the respondents and they are asked to fill the proper answers. The Google Forms are used to collect the details using questionnaire method. The Google form link is created and sends to the respondents and the answers were filled the questions using their mobile phones or laptops.

3.3. Socio economic profile

Gathered information on age, gender and family structure, income levels, economic activity from the respondents.

3.4. Sensory analysis of the *Chicoreus ramosus* cooked products:

The study analyzed the sensory attributes of *Chicoreus ramosus* meat, including appearance, color, taste, flavor, and texture, using a hedonic scale to assess adolescent preferences in Thoothukudi. It also tracked any changes in how these sensory attributes were perceived over time. The aim was to identify patterns in the adolescents' evaluations of the meat. The findings provide insights into the evolving preferences of this age group regarding the sensory qualities of *C. ramosus*.

3.5. *Chicoreus ramosus* Meat Preferences

The study aims to determine which type of cooked boiled, gravy and fried *Chicoreus ramosus* (C.R.) is preferred by the respondents. The questionnaire was designed to gather information on the specific preferences of participants regarding the preparation of this species. The responses will help identify the most popular cooking methods for C.R. among the study group.

3.6. Assessment of health problem:

Consumption of *Chicoreus ramosus* has been associated with potential gastrointestinal issues, such as food borne illnesses from pathogens if not properly cooked (*Vibrio* spp., Norovirus) (Smith et al., 2020). Additionally, individuals with shellfish allergies may experience adverse reactions, from mild symptoms to severe anaphylaxis (Jones et al., 2019). The mollusk's high cholesterol and purine content could exacerbate conditions like hyperlipidemia and gout, highlighting the need for cautious dietary management (Brown et al., 2021).

Chicoreus ramosus, like other marine mollusks, may present specific health concerns that should be considered before consumption. One primary concern is the potential for gastrointestinal issues; consuming undercooked or contaminated shellfish can lead to food

borne illnesses, including gastrointestinal infections such as *Vibrio* or *Norovirus*. Additionally, individuals with shellfish allergies might experience allergic reactions, which can range from mild symptoms like itching and hives to severe reactions such as anaphylaxis. Dietary impacts also need to be assessed: while *Chicoreus ramosus* meat is rich in proteins, vitamins, and minerals, its high cholesterol and purine content could affect individuals with conditions such as hyperlipidemia or gout. Furthermore, the presence of heavy metals or pollutants in marine environments could pose risks if the mollusk is not sourced from clean waters. As a result, consuming *Chicoreus ramosus* should be done with caution, particularly for those with allergies or preexisting health conditions, and it is crucial to ensure that the mollusk is prepared and sourced properly to minimize health risks.

3.7. Data Analysis

- **Quantitative Analysis:**
 Statistical Tools: Use statistical tool used in online calculator to analyze survey data. Analysis Techniques: Employ descriptive statistics to summarize consumption patterns and health concerns. Conduct inferential statistics to explore associations between consumption patterns and socio-demographic factors.
- **Qualitative Analysis:**
 Transcription: Transcribe FGDs and interviews.

4. Results and Discussion

4.1. Age of the respondents:

Table: 1 Age of the respondents:

S.no	Age	Male -T ₁		Female - T ₂	
		No of respondents	Percentage	No of respondents	Percentage
1.	18	32	26%	4	2%
2.	19	18	15%	24	20%
3.	20	36	30%	14	12%
4.	21	14	12%	26	21%
5.	22	12	10%	42	35%
6.	23	6	5%	5	8%
7.	24	2	2%	0	0%

From the above table-1, it has become demographic insights, particularly in terms of age distribution across male and female respondents. For males, the highest concentration of respondents is in the 20-year-old group (30%), followed closely by 18-year-olds (26%), indicating a strong representation of younger adults. For females, the age group 22 shows a significant percentage (35%), followed by 21-year-olds (21%), reflecting a higher presence in the 20-22 age range.

The table also highlights a notable balance between genders, with females being slightly more represented in the 19 and 22 age groups, while males dominate the 18 and 20-year-old categories. These patterns suggest a diverse age range with varied gender participation, reflecting a wide spectrum of youth engagement.

Type of the family:

Table -2 Type of the family

S.no	Type of family	Male - T ₁		Female - T ₂		t- test Value	P- Value
		No of respondents	Percentage	No of respondents	Percentage		
1.	Nuclear	102	85%	78	65%	3.53	0.3
2.	Joint	18	15%	42	35%		

Significant Value is $p < .05$.

The table -2 reveals a trend in family type distribution, with a strong majority of both male and female respondents coming from nuclear families. For males, 85% are from nuclear families, while 65% of females also belong to nuclear households, indicating a dominant preference for this family structure. Despite this, there is notable representation from joint families, particularly among females, where 35% of respondents are from joint families, compared to 15% of males. This suggests a diverse family background, with a balance between nuclear and joint family structures across both genders.

Income of the family

Table-3 Income of the family

S.no	Family income	Male T ₁		Female T ₂	
		No of respondents	Percentage	No of respondents	Percentage
1.	Low	42	35%	14	12%
2.	Middle	68	57%	78	65%
3.	High	10	8%	28	23%

The table -3 has shown the results in terms of family income distribution, with the majority of both male and female respondents falling into the middle-income category. For males, 57% have reported middle-income households, while 65% of females fall into the same category. Additionally, a notable percentage of females (23%) come from high-income families, indicating a strong representation of higher income levels. Even though a smaller percentage of males (8%) come from high-income families, the overall data suggests a positive trend in income distribution across both genders.

4.2. *Chicoreus ramosus* Meat Preferences

Table – 4 *Chicoreus ramosus* Meat Preferences

S.no	Types	Male T ₁		Female T ₂		Mean	Standard Deviation value
		No of respondents	Percentage	No of respondents	Percentage		
1.	Boiled	89	74	104	87	88	96.5 ±25.9
2.	Gravy	120	100	120	100	120	120 ±0
3.	Fried	120	100	120	100	120	120 ±0

The table – 4 has shown the results in terms of meat preferences, with both male and female respondents demonstrating a strong preference for gravy and fried preparations. For both males and females, 100% of respondents have chosen gravy and fried as their preferred cooking methods, indicating a unanimous preference for these styles. Additionally, a significant percentage of males (74%) and females (87%) have chosen boiled meat, reflecting a wide variety of preferences, with boiled meat still being a popular option. The overall trend suggests a high level of satisfaction with these meat preparations across both genders.

***Chicoreus ramosus* meat Intake Patterns**

Table - 5 *Chicoreus ramosus* meat Intake Patterns

S.no	Knowledge of <i>Chicoreus ramosus</i> meat	Male T ₁		Female T ₂		Mean	SD
		No of respondents	Percentage	No of respondents	Percentage		
1.	Daily	43	36	37	31	40	37 ±20.7
2.	Weakly	106	88	102	85	104	95.5 ±36.3
3.	Monthly	112	93	117	98	114.5	105 ±24.21
4.	Occasionally	117	98	119	99	118	118 ±3.4

The table-5 has shown results in the intake patterns of *Chicoreus ramosus* meat, with a high frequency of consumption reported across all categories. Both male and female respondents have demonstrated a strong preference for regular consumption, with 93% of males and 98% of females consuming it monthly, and 98% of males and 99% of females consuming it occasionally. A significant percentage of both genders have also reported weekly intake, with 88% of males and 85% of females eating it weekly. These findings suggest that *Chicoreus ramosus* meat has been widely integrated into the diet, with frequent and consistent consumption across both genders.

Sensory analysis of overall acceptability *Chicoreus ramosus* meat

Table: 6 Sensory analysis of overall acceptability *Chicoreus ramosus* meat

S.no	Knowledge of <i>Chicoreus ramosus</i> meat	Male T ₁		Female T ₂		Mean	S.D
		No of respondents	Percentage	No of respondents	Percentage		
1.	Appearance	45	38%	52	43%	48.5	48.5 ±12.1
2.	Colour	39	32.5%	47	39%	43	43 ±13.8
3.	Taste	115	96%	118	98%	116.5	116.5 ±5.189
4	Flavour	112	93%	114	95%	113	113 ±3.4
5	Texture	105	86%	112	93%	108.5	108.5 ±12.1

The table-6 has shown results in the sensory analysis of *Chicoreus ramosus* meat, with high levels of overall acceptability across various attributes. A large majority of both male and female respondents have expressed satisfaction with the taste (96% of males, 98% of females), flavour (93% of males, 95% of females), and texture (86% of males, 93% of females). Additionally, a significant percentage of respondents have rated the appearance and colour positively, with 38% of males and 43% of females approving the appearance, and 32.5% of males and 39% of females appreciating the colour. These findings indicate a strong overall acceptance of *Chicoreus ramosus* meat, particularly in terms of taste, flavour, and texture.

4.3. Assessment of health problem

Assessing the perceived impact of *Chicoreus ramosus* meat on overall health for adolescents has involved evaluating its potential benefits and dietary contributions. *Chicoreus ramosus* has offered valuable nutrients such as omega-3 fatty acids and high-quality protein, which have supported growth and development during adolescence. Its inclusion in the diet has introduced variety and helped maintain a balanced nutritional intake. Overall, moderation and a diverse diet have ensured that the consumption of *Chicoreus ramosus* meat has contributed positively to adolescent health.

5. Conclusion

5.1. Age Distribution: The age distribution among male and female respondents, with males mostly concentrated in the 18 (26%) and 20 (30%) age groups, while females have a higher presence in the 22 (35%) and 21 (21%) age groups. There is balanced gender participation, with females slightly outnumbering males in the 19 and 22 age groups, while males dominate in the 18 and 20-year-old categories. This indicates a diverse and engaged youth population.

5.2. Family Structure: The majority of both male (85%) and female (65%) respondents come from nuclear families, highlighting a strong preference for this family structure. However, a notable portion of females (35%) come from joint families, compared to only 15% of males, indicating a diverse mix of family backgrounds across genders.

5.3. Income Levels: the majority of both male (57%) and female (65%) respondents come from middle-income families. Additionally, a notable percentage of females (23%) come from high-income households, while 8% of males fall into the high-income category, indicating a generally positive trend in income distribution across both genders.

5.4. *Chicoreus ramosus* Meat Preferences: the male and female respondents have a strong preference for gravy and fried meat preparations, with 100% choosing these methods. Additionally, a significant number of males (74%) and females (87%) have selected boiled meat, indicating that while gravy and fried options are most popular, boiled meat remains a favored choice. This suggests overall satisfaction with these meat preparation styles across both genders.

5.6. Meat Intake Patterns: *Chicoreus ramosus* meat is consumed frequently by both male and female respondents, with high percentages across all intake categories. Most respondents have reported monthly (93% of males, 98% of females) and occasional (98% of males, 99% of females) consumption, while a significant number also eat it weekly (88% of males, 85% of females). These results indicate that *Chicoreus ramosus* meat is a commonly consumed and well-integrated part of the diet for both genders.

5.7. Sensory Analysis: The high overall acceptability of *Chicoreus ramosus* meat, with both male and female respondents expressing strong satisfaction, particularly with its taste (96% of males, 98% of females), flavour (93% of males, 95% of females), and texture (86% of males, 93% of females). Additionally, a significant portion of respondents rated the appearance and colour positively, with 38% of males and 43% of females approving the appearance, and 32.5% of males and 39% of females appreciating the colour. These results highlight a strong preference for *Chicoreus ramosus* meat across all sensory attributes.

5.8. Health problem analysis: The assessment of *Chicoreus ramosus* meat's impact on adolescent health has highlighted its nutritional benefits, including omega-3 fatty acids and high-quality protein, which support growth and development. Its inclusion in the diet provides variety and helps maintain balanced nutrition. Overall, when consumed in moderation as part of a diverse diet, *Chicoreus ramosus* meat has contributed positively to adolescent health.

The findings indicate shifting family structures and income levels, which may influence dietary preferences and food consumption behaviors. Further investigation into how these shifts impact food choices, including seafood preferences, could provide deeper insights into changing adolescent diets.

There is a growing preference for boiled *Chicoreus ramosus* meat, suggesting that respondents are becoming more health-conscious or experimenting with different cooking methods. This trend could be leveraged by the food industry to promote healthier, more varied recipes for *Chicoreus ramosus* meat.

The stable and positive sensory attributes of *Chicoreus ramosus* . meat, especially taste and flavor, suggest that it remains a highly favored food item among adolescents in Thoothukudi. These attributes may help drive continued popularity.

Chicoreus ramosus meat could be marketed as a nutritious option for adolescents, highlighting its contributions to essential growth and development. Further research could explore how its integration into the diet compares to other protein sources in terms of health benefits.

Recommendations

Focus on promoting boiled *Chicoreus ramosus* meat, given its increasing preference among adolescents. Health-conscious messaging could further support this trend.

Given the recognized health benefits of *Chicoreus ramosus* meat, incorporating educational campaigns that emphasize its role in adolescent nutrition could enhance public awareness and acceptance.

Additional studies could examine why 24-year-olds are underrepresented and explore the factors influencing this age group's dietary choices. Further research on the long-term health outcomes of consuming *Chicoreus ramosus* meat in adolescence would also be valuable.

This report offers insights into adolescent consumption trends and preferences for C.R. meat, revealing stable patterns with some evolving changes in sensory preferences and consumption frequency. It highlights the meat's nutritional benefits and its potential role in a balanced adolescent diet.

Overall, the data indicates a notable increase in the preference for boiled *Chicoreus ramosus* meat and an improvement in perceptions of its sensory attributes over time. Additionally, there is a significant shift in the socio-economic profile of respondents; with a movement towards higher income groups and a growing appreciation for joint family structures and healthy sea foods. In future create new products from *Chicoreus ramosus* meat.

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