

SALT PREFERENCE : AGE AND SEX RELATED VARIABILITY

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Abstract : Salt preference was assessed in 60 adults of 18–21 yrs of age (30 males and 30 females) and in 60 children of 7–12 yrs of age (30 boys and 30 girls). Subjects rated the preference on Likert scale for popcorns of five salt concentrations (0M, 1M, 2M, 3M and +3M). Statistical analysis using Two way ANOVA revealed statistically significant effect of age and sex on salt preference ($F_{4,100} = 15.027$, $P < 0.01$) and One Way ANOVA revealed statistically significant sex difference in salt preference of adults ($F_{4,50} = 16.26$, $P < 0.01$) but no statistically significant sex difference in salt preference of children ($F_{4,50} = 4.08$, $P > 0.05$). Dietary experiences during development and more physical activity in children may be responsible for higher salt preference in children while finding no sex variability in children favours the role of sex hormones in salt preference of male and females.

Key words : salt preference age and sex variation sex hormones

INTRODUCTION

Taste provides a vital gateway for perceptual judgment as to what may be appropriate or inappropriate to swallow. It also serves to make life more pleasurable as, sensation of taste provides internal satisfaction. Like sucrose and fat, salt is also considered as palatable food. Conflicting data exists in the literature regarding the maturity of the human sense of taste during childhood (1). The effective response to salt appears as late as the age of 4 years and to sweet, sour and bitter appear early in life (2, 3). Taste threshold (taste acuity) varies with age, sex, season and smoking (4, 5, 6). Loss of static and dynamic body weight also affects taste response (7).

Prior studies said that taste preference and palatability both are also strongly affected by salt and acid (8). It has been observed that in absence of need human preference for sweet and salt taste is innately determined. Dietary experiences during development determines the appropriate food related context for these appealing tastes (9). At relatively young age children under age of 8 years prefer familiar, somewhat bland flavors and expand their liking for more exciting flavors as they grow older. Children of age 8–12 years know sweet and sour but they have less consistent response to salt than adults (10). Preference to salt also shows sex variation (11) and in females it varies with different phases of menstrual cycle (12).

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Gender difference in taste perception and preference has been reported by several authors (13, 14). Glavnville et al observed gradual decrease in taste sensitivity upto 16–20 yrs of age followed by exponential decline in it. Also Cohan and Gitman found high incidence of taste error in recognizing the basic tastes in men in comparison to women. But it is still unclear whether salt preference varies with age and sex especially before maturity and after attaining maturity. As there are very few studies in this regard so in the present study age and gender variation in salt preference has been attempted.

MATERIALS AND METHODS

The study was conducted in the Department of Physiology, HIMS, Dehradun. 60 medical students of 18–21 years of age (30 males and 30 females) and 60 children of 7–12 years of age from HIHT campus and from nearby schools (30 boys and 30 girls) participated in the study. To avoid any seasonal variations the study was undertaken in the month of March in both groups. All the females were examined in their menstrual phase of menstrual cycle to rule out the effect of hormones on salt preference. The ethic committee of the institute had approved the study.

Freshly made popcorns were used for this study because of their bland taste. Sodium chloride solution of five different concentrations (OM, 1M, 2M, 3M and +3M) were prepared in distilled water (+3M solution was made by mixing 10 g sodium chloride to 100 ml of 3 M solution). Five sets of popcorns were made by popping 80 gms (1/3 cup) of unpopped corn and sprayed

with 14 ml of one of the salt solutions uniformly by using spray bottle. Then popcorns were mixed thoroughly and were allowed to dry in air. Ten to fifteen popcorns of specific concentration were kept in one packet and labeled with coded alphabet that was not known to subjects. Such packets of all five salt concentrations were kept in random order in a large paper bag.

The potential subjects were told about the design of experiment. The participating subjects signed an informed consent form. In case of children the consent was taken from their parents. The test was performed in the groups of 7–8 subjects each. A questionnaire was filled by the subjects to mention their age, height, weight, if taken any food recently or were on any medication and to mention over all preference for sweet, salt, spicy or bitter food. Each of the subject was given a paper bag containing all 5 packets of popcorn, a rating sheet and a glass of water. Then they were asked to taken out 1 packet of popcorn from paper bag, starting with top one, to preserve random order. Then they were instructed to put all popcorns of the bag in their mouth, to chew and to rate them before swallowing first for the saltiness (to assess their taste sensitivity for salt) and secondly the preference on a 7 point Likert scale (1 = least salty/preference, 7 = most salty/preference). After completing rating and consuming popcorn, they were asked to drink some water to clean their mouths (to break the prolonged and repeated stimulation of taste buds). In the similar manner, subjects were instructed to rate rest of the 4 packets. All the subjects were asked to remain silent while they made their rating to avoid influencing the rating of others.

Statistical analysis

- Two way ANOVA was done to see whether there is any effect of age and sex on salt preference for all five salt solutions.
- One – way ANOVA was done separately to find out sex related variability for salt preference in adults and children for all five salt concentrations.

RESULTS

Mean age of child group (30 boys and 30 girls) was 10 ± 1.2 yrs and that of adult group (30 males and 30 females) was 19.5 ± 1.3 yrs.

The rating for saltiness was similar in both groups.

Two way ANOVA revealed statistically significant effect of age and sex on salt preference with all five salt concentrations ($F_{4,100} = 15.027$, $P < .01$).

Salt preference was statistically significant higher in children i.e. children liked more salty popcorn (+3M conc) while adults liked less salty popcorn (2M conc) ($F_{4,100} = 13.08$, $P < .01$) (Table I).

One way ANOVA used for adult group revealed statistically significant difference in salt preference of males and females ($F_{4,50} = 16.26$, $P < .01$). Female subjects liked more salty popcorn (3M conc) while male subjects liked less salty popcorn (2M conc) (Table II).

On the other hand there was no

TABLE I: Salt preference in different age group.

Salt concentration	Salt preference rating on Likert scale	
	Adult group (mean±sd) (n=60)	Child group (mean±sd) (n=60)
0M	1.8±0.31	1.8±0.29
1M	2.1±0.35	2.8±1.25
2M	3.4±0.42	3.6±1.52
3M	3.4±0.37	4.3±1.86
+3M	2.8±0.27	4.3±1.86
Total	2.6±0.34	3.36±1.35

TABLE II: Sex variation in salt preference of adults and children.

Salt concentration	Salt preference rating on Likert scale			
	Adult group (mean±sd)		Child group (mean±sd)	
	Males (n=30)	Females (n=30)	Boys (30)	Girls (n=30)
0M	1.7±0.30	2.0±0.32	1.9±0.29	1.8±0.29
1M	2.0±0.35	2.5±0.36	2.8±0.21	2.9±1.3
2M	3.0±0.42	3.9±0.43	3.5±1.42	3.8±1.63
3M	2.8±0.32	4.1±0.43	4.2±1.91	4.3±1.82
+3M	2.6±0.29	3.0±0.28	4.3±1.91	4.3±1.82
Total	2.4±0.33	3.1±0.36	3.34±1.34	3.44±1.37

statistically significant sex variation in the salt preference of children group ($F_{4,50} = 4.08$, $P > .05$). Both boys and girls liked higher similar salt concentration i.e. 3M & +3M (Table II).

DISCUSSION

Taste preference begins to develop as early as 3–4 month of life and is built up according to what is fed during infancy (9). Although the degree to which adult taste preference can be influenced by early taste exposure is a matter of debate. Although

there is decrease in taste sensitivity with increasing age (15) but this is not true when comparison was made between children and young adults (1). Children at the age of 8–9 years have well developed taste senses (9).

Present study reported statistically significantly higher salt preference in children in comparison to adults (Fig. 1). A survey also reported that children prefer and consume statistically significantly more salt in comparison to adults (16). Dietary experiences during development determine the intake of appropriate food and preference in taste, since children are more exposed to salty food (kurkure, chips, fast food etc.) which results in frequent availability of Na⁺ to taste buds causing increased salt preference (9, 17). Further children are more physically active than adults so more loss of sodium in perspiration in children leading to activation of aldosterone and angiotensin II hormones and salt preference (18).

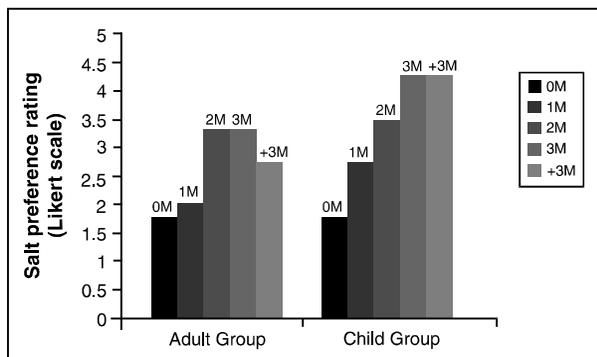


Fig. 1: Salt preference in two age group.

In addition to noting differences in salt preference between youngs and children, sex difference in salt preference was also observed amongst adult and child group in

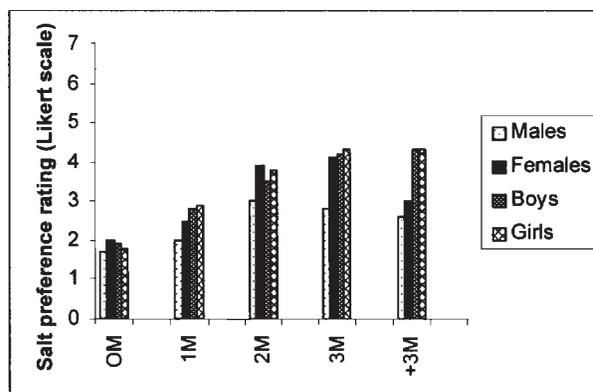


Fig. 2: Sex variation in salt preference.

the present study (Fig. 2). Young females made statistically significantly higher preference rating for various salted popcorns than young adult males. On the other hand there was no statistical significant sex difference for salt preference in case of children i.e. both girls & boys liked similar concentration of salty popcorns. This sex variability in salt preference may be due to difference in the nature of the sex hormones. Previous studies reported that salt preference in females increase during periovulatory phase when levels of endogenous hormones are high (12) or when the levels of these hormones are increased exogenously (19). This is in contrast to the findings of Frye and Dermolar (11) who reported that male prefer more salt concentration than females and he explained that this might be due to high testosterone level in male, more body mass and consume more food but they gave no other study in support of their findings. In contrast increase intake of salt in female rats has been reported (20), similar to findings of present study, which might be due to stimulatory action of ovarian hormones on females taste mechanism. Finding, no sex related variability in child group in salt

preference further proves the role of sex hormones to this phenomenon as in this group the level of these hormones was quite insignificant.

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