

Milk and Beverage Preferences of College Students

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Abstract

The purpose of this study was to determine relationships among the observed frequencies of 12 beverages selected by college men and women according to sex, age, race, and academic classification and to estimate consumption of milk according to sex, age, race, and academic classification. The instrument consisted of a check list and four questions. The sample of 282 subjects, 149 college men and 133 college women, was made by the accidental choice method. Observations occurred in the university center cafeteria at the dinner meal. The significant relationships were sex and race in association with beverage selections by all subjects. The proportion of men in the distribution who selected regular, carbonated soft drinks and the proportion of white students who selected any of the carbonated soft drinks were the influencing frequencies. The result of the study indicated that carbonated soft drinks were the most preferred items followed by milk, water, iced tea, fruit juices, coffee, cocoa, and tea.

Key words : beverages, sex, age, race, academic classification

INTRODUCTION

The offering of a drink is an act of hospitality practically everywhere in the world. The beverage may vary with the climate, the time of day, and the customs of the country. In fact, several kinds of beverages are consumed not for food value but rather for thirst-quenching properties or for their stimulating effects¹⁾. Beer, wine, and carbonated soft drinks furnish calories; coffee and tea, although noncaloric, frequently are consumed with cream or sugar which provide caloric intake²⁾.

In the United States, college students represent an important group of consumers. Although several studies of their overall food preferences and selection patterns have been conducted³⁻⁵⁾, few studies focusing on beverage consumption and preference patterns of college students have been made.

Trends at the national level, showing an increase in soft drink consumption and a decrease in milk consumption⁶⁾, point to a need to examine beverage pre-

ferences of college students. One such study of beverage preferences of college students showed the relative popularity of cola-type drinks and some milk with meals while hot beverages were least preferred⁷⁾. Also, a recent survey indicated that college students represent an important group of beverage consumers, and most university students drink significant amounts of milk⁸⁾. However, a tendency was observed for college students to prefer beverages with more calories and much less nutritional value than milk⁹⁾. As an important single food, milk contains all the nutrients needed by the young for vigorous growth and for producing blood, muscle, and bone¹⁰⁾. For types and quantities of beverages consumed by children and teenagers, Stults *et al.*¹¹⁾ showed milk and milk drinks to be the most frequently consumed beverages and the beverage group consumed in the greatest volume.

The dietary habits of college students are of interest in part because these behaviors may reflect their adjustments to a new way of living. For many students, college living is their first experience in a situation in which they have an opportunity to make their own food selections. Hopefully, the results of this study

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can be used to encourage university food service directors to offer readily available serving sizes, serving times, and beverage choice preferred by university students.

For the study operational definitions were established regarding milk in fluid form, other beverages available, and consumption based on selection. Milk was defined as beverage among other beverages available for drinking. The selection of milk by students indicated preference over other beverages at the time of selection. Other beverages were those available in the study's environment and included (a) fruit juice/fruit flavored beverages, (b) regular and diet carbonated beverages, (c) hot coffee, tea, and cocoa, (d) iced tea, and (e) water. Regardless of the selection, the subject's beverage consumption was assumed to total the selected purchase unit. Consumption of milk was a reflection of choice for milk as a beverage and was a general indication of amount consumed relative to other beverages.

MATERIALS AND METHODS

Instrument development and use

The instrument, developed by the investigator, consisted of a check list and four questions. The format permitted rapid checking of the factors sex, race, age (estimated), and academic classification. Confirmation of these factors was possible during a brief interview. Beverage items placed on individual trays were checked for frequency and order of selection if multiple selections were made. Beverage items were assigned to the categories milk, fruit juice, carbonated beverages, hot beverages, iced tea, and water. Altogether 12 items were designated for recorded observations. Although the instrument was designed for noting the meal time and the serving time, these variations in time were not used in the study. A section called comments was provided. Except for clarification of a response no specific comments were made by subjects which might pertain to the study.

Subjects

The sample of 282 subjects, consisting of 149 college men and 133 college women, was selected in

the cafeteria by the accidental method (Table 1). The college students, enrolled during the winter quarter, 1990, consisted of 197 White, 50 Black, 26 Asian and 9 Arabic students. The category "other" was replaced by the term "Arabic" since nine students of this ethnic group occurred in the sampling procedure.

Permission procedures

Permission to conduct the study in the cafeteria was obtained from the food service director. Subject's consent was consistent with each participant freely responding to the interview. No observations were used without the subject's acknowledgement. *Observation records did not include names or sufficient data for personal identification.*

Data analysis

The observation records for each dependent variable were sorted according to sex, age, race, and academic classification. Data pertaining to the 16 selected hypotheses were entered into the computer and analyzed by the Chi-square Test. Results were tabulated in clusters based on the factors sex, age, race, and academic classification. Percentage selection of itemized beverages according to the named factors were depicted in figures rendered by the microcomputer software Quattro Pro.

RESULTS AND DISCUSSION

Data for this study were collected for the purpose

Table 1. Distribution of 282 subjects by sex, age, race, and academic classification

	Factor	Number	Percent of total
Sex :	Male	149	52.8
	Female	133	47.2
Age :	18~24	243	86.2
	25~39	39	13.8
Race :	White	197	69.9
	Black	50	17.7
	Asian	26	9.2
	Arabic	9	3.2
Academic classifi- cation :	Freshman	68	24.1
	Sophomore	78	27.7
	Junior	82	29.1
	Senior	54	19.1

of comparing the frequency of beverages selected by students according to sex, age, race, and academic classification. The estimates for student's milk consumption were based on responses for acceptability, frequency, and preferred meal for milk as a beverage. Four dependent variables were tested individually by the independent variables sex, age, race, and academic classification.

Testing of hypotheses

The following 16 separate hypotheses were stated in the null form. Each was tested using the Chi-square test at the 0.95 confidence level. When the dependent variables were tested by sex and age, the tests had the same degree of freedom. Tabulations of results showed the calculated and the critical X^2 coefficients.

Selection of beverage

For hypotheses 1 through 4 the emphasis was on selection of beverage (Table 2). There is no significant difference in the selection of beverages by students according to age and academic classification except for sex and race.

Acceptability of milk

For hypotheses 5 through 8 the emphasis was on acceptability of milk (Table 3). There is no significant difference for the acceptability of milk as a beverage affirmed by students according to sex, age, race, and academic classification.

Frequency of consumption of milk

For hypotheses 9 through 12 the emphasis was on frequency of consumption of milk (Table 4). There is no significant difference in the estimated frequency of consumption of milk as a beverage affirmed by students according to sex, age, race, and academic classification.

Preferred mealtime for milk selection

For hypotheses 13 through 16 the emphasis was on preferred mealtime for milk selection (Table 5). There is no significant difference in the preferred meal time for milk as a beverage affirmed by students according to sex, age, race, and academic classification.

Table 2. Frequency and Chi-square coefficients for the selection of beverage items in categories by sex, age, race, and academic classification

Factors	Beverage items in categories											Water	df	X ² coeffi.			
	Milk		Fruit juices			Carbonated beverage		Hot beverage			Iced tea			Calc.	Critical		
	2% fat	Choco	Orange	Lemon	Other	Regular	Diet	Coffee	Tea	Cocoa							
Sex :																	
Male	22	9	6	2	2	80	3	6	0	1	9	9	11	20.50*	19.68		
Female	19	7	7	2	0	50	16	5	2	2	11	12					
Age :																	
18~24	33	14	9	3	2	113	19	8	1	3	17	21	11	15.34	19.68		
25~39	8	2	4	1	0	17	0	3	1	0	3	0					
Race :																	
White	23	9	8	2	2	99	17	5	0	0	16	16	33	96.39*	47.4		
Black	11	5	3	1	0	19	1	2	0	1	2	5					
Asian	7	2	2	1	0	9	1	0	1	1	2	0					
Arabic	0	0	0	0	0	3	0	4	1	1	0	0					
Academic Class :																	
Fresh.	10	3	5	1	0	25	4	4	1	1	5	5	33	23.25	47.4		
Soph.	12	2	1	2	1	44	6	1	0	0	5	4					
Junior	10	8	4	1	0	37	6	6	0	1	8	6					
Senior	9	3	3	0	1	24	3	0	1	1	2	6					

* $p < 0.05$

Percentage selection of beverages by subjects

The beverage available for purchase observed as selections by the subjects were depicted by percentage selection in Fig. 1. The relationships among the items and among the categories are emphasized visu-

ally. The proportion of soft drinks compared to other categories is given some impact. The strengths of the significant associations for selection by subjects' sex and race may be shown graphically in figures which follow.

Table 3. Frequency, percent, and Chi-square coefficients for the acceptability of milk as a beverage among college students by sex, age, race, and academic classification

Factors	Acceptability of milk as a beverage				df	X ² coefficients	
	Yes	(%)	No	(%)		Clac.	Critical*
Sex :							
Male	145	97.31	4	2.68	1	1.50	3.84
Female	132	99.24	1	0.75			
Age :							
18~24	239	98.35	4	1.64	1	0.16	3.84
25~39	38	97.43	1	2.56			
Race :							
White	194	98.47	3	1.52	3	6.13	7.82
Black	50	100.00	0	0.00			
Asian	25	96.15	1	3.84			
Arabic	8	88.88	1	11.11			
Academic classification :							
Freshman	66	97.05	2	2.94	3	1.83	7.32
Sophomore	77	98.71	1	1.28			
Junior	80	97.56	2	2.43			
Senior	54	100.00	0	0.00			

*p<0.05

Table 4. Frequency and Chi-square coefficients for the weekly rate of consumption of milk of a beverage among college students by sex, age, race, and academic classification

Factors	Weekly rate of consumption					df	X ² coefficients	
	None	Once	Twice	Three-five	More than five		Cacl.	Critical*
Sex :								
Male	4	7	27	78	33	4	2.74	9.49
Female	1	5	28	75	24			
Age :								
18~24	4	10	50	134	45	4	4.03	9.49
25~39	1	2	5	19	12			
Race :								
White	3	7	39	117	31	12	6.02	21.03
Black	0	0	9	21	20			
Asian	1	4	6	9	6			
Arabic	1	1	1	6	0			
Academic classification :								
Freshman	2	2	11	37	16	12	6.60	21.03
Sophomore	1	4	21	36	16			
Junior	2	4	14	45	17			
Senior	0	2	11	33	8			

*p<0.05

Percentage selection of beverages by sex

Fig. 2 showed that men and women subjects selected approximately the same amounts of milk beverages (20.7% to 19.6%). Intakes of fruit juice/fruit flavored drinks were similar and in low percentage for each sex. The remaining selections differed in regard to beverages having inherent caloric content. Regular soft drinks which are high in sugars were selected more frequently by men than by women (53.7% to 37.5%). Diet soft drinks, hot beverages, iced tea, and water—all of which are essentially non-caloric—were consumed more by women than by men (25.

6% to 12.7%). Apparently the differences in caloric values of the available beverages influenced the selections made by men and women, the women choosing the low caloric items. The proportions in the figure shown how the sample population is in close agreement with the finding of Khan⁷ who reported that 57.3% of a sample of college students at Albright College consumed carbonated soft drinks. Also the present findings are similar to those of Morgan et al.¹² who found that 45% of a sample of adolescents consumed the regular sweetened carbonated soft drinks.

The current survey of student's trays in the univers-

Table 5. Frequency and Chi-square coefficients for the preferred meal time for consumption of milk as a beverage among college students by sex, age, race, and academic classification

Factors	Daily Meal-Time					df	X ² coefficient	
	Breakfast	Lunch	Dinner	Snack	none		Calc.	Critical*
Sex :								
Male	58	37	33	17	4	4	4.73	9.49
Female	59	29	22	22	1			
Age :								
18~24	105	55	48	31	4	4	3.37	9.49
25~39	12	11	7	8	1			
Race :								
White	81	44	38	31	3	12	18.51	21.03
Black	21	16	6	7	0			
Asian	11	6	7	1	1			
Arabic	4	0	4	0	1			
Academic classification :								
Freshman	32	13	11	10	2	12	11.98	21.03
Sophomore	34	18	12	13	1			
Junior	29	20	17	14	2			
Senior	23	14	15	2	0			

*p<0.05

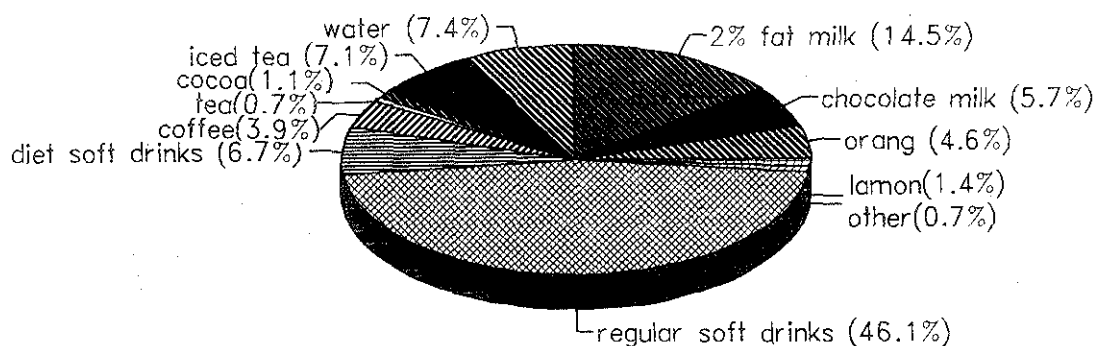


Fig. 1. Percentage selection of the itemized beverages by all subjects.

ity cafeteria disclosed that 20.2% and 6.7% of the total sample selected milk and fruit juices. The ratio for selected hot beverages was in accordance with the finding of Khan⁷ who reported that hot beverages were the least preferred item with meals.

Percentage selection of beverages by race

The subject's race as a significant factor affecting beverage selection was influenced heavily by approximately 59% of white students selecting carbonated soft drinks (Table 2, Fig. 3). Other categories of beverages showed interesting proportions among the four race subgroups, but the percentage frequencies were of less impact on the outcome. The percentage for coffee was the greatest for Arabic students, for whom coffee drinking is culturally and historically important. Small percentages were observed for consumption of hot tea and cocoa by race of subjects though these hot drinks were not differentiated clearly in the histogram (Fig.3). The contrast between the usual serving temperatures of the two beverage categories "iced"

soft drinks vs "hot" beverages and their preferences by subjects in the winter time poses another relationship for study.

Percentage selection of beverages by age group

As indicated in Fig. 4, the age group of 18 to 24 years old had the highest percentage of subjects who consumed regular soft drinks (46.1%). Students between 25 to 39 years were the principal consumers of diet soft drinks (6.74%). The second most popular beverage group for all ages was milk (20.2%). Both orange juice and lemonade appeared to decrease in usage by age group. The frequency of selections of fruit-juice/fruit flavored beverages probably was affected by the time of day (lunch/dinner) as well as the time of year when observations were recorded. These beverages are culturally popular for breakfast and lunch time and during warm weather.

Based on the above findings, nutrition education, marketing strategies, and advertising focused on promoting the increased consumption of milk might be

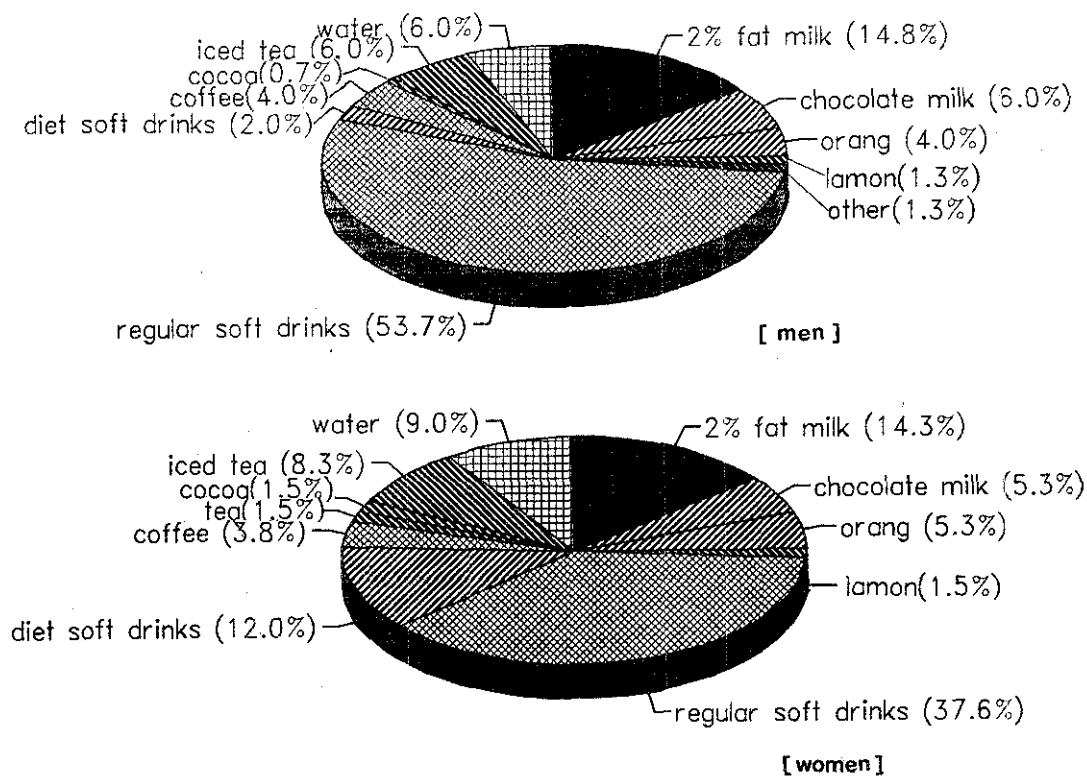


Fig. 2. Percentage selection of the itemized beverages by sex.

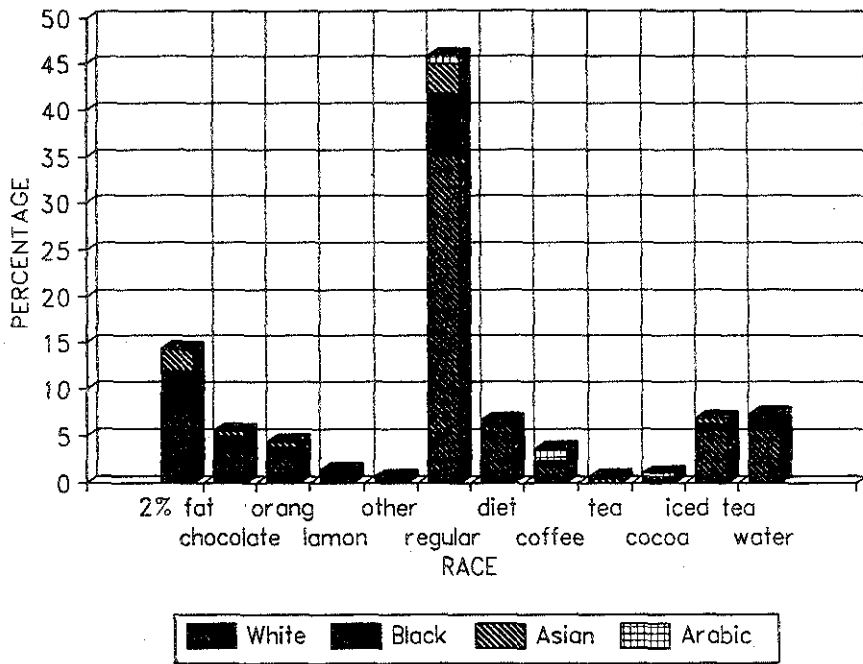


Fig. 3. Percentage selection of itemized beverages by race, one of the significant outcomes of Chi-square test.

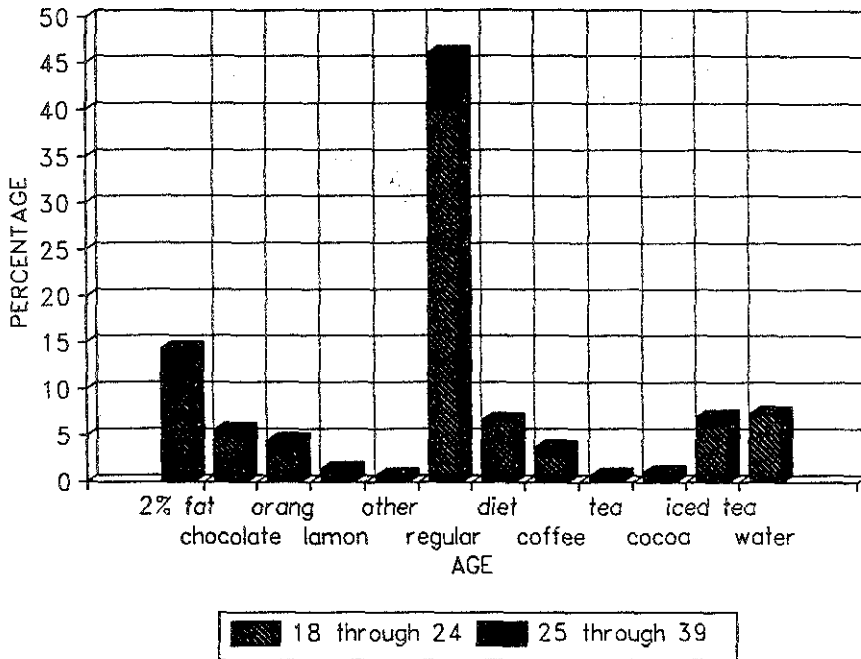


Fig. 4. Percentage selection of itemized beverages by age group or subjects.

directed toward the college student population. Coordination of content between the nutrition curriculum and the food service promotions could lead to an improved nutritional status among students and an increased revenue in the food service budget. Detailed analysis by sex, age, race, and academic classification would provide useful information for predicting serving sizes and times and for menu planning for specific groups. A further analysis by race or nationality might indicate beverage preferences which well accommodate a multicultural student body.

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대학생들에 대한 우유와 음료수의 기호성

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요 약

미국 남녀 대학생 282명을 대상으로 학교식당에서 저녁식사 때의 음료수로서의 우유 소비성향을 평가하고 이들의 성별, 나이, 인종과 교육정도에 따라 선택하는 12가지 음료수의 기호성에 대한 상관관계에 대해 조사하였다. 조사대상자들의 음료수에 대한 기호성은 단지 성별과 인종에 대해서만이 5% 유의수준에서 정적 상관관계가 있었고 모집단의 각 표본에 대한 우유 소비성향의 가설은 모두 뚜렷한 상관관계가 없는 것으로 나타났다. 그리고, 음료수에 대한 기호성의 순서는 탄산함유음료, 우유, 물, 냉홍차, 천연과실쥬스, 커피, 코코아 등으로 나타났다. 음료수로서의 우유에 대한 기호도는 남학생 (20.7%)과 여학생 (19.6%)의 두 집단이 거의 비슷한 비율이었으며, 당의 함량이 높은 탄산함유음료의 경우 여학생 (37.5%) 보다 남학생 (53.7%)이 다소 높은 선택빈도율로 나타났다. 또한, 인종별 음료수 기호성에서도 탄산함유음료가 높은 비율이었고 특히 아랍계 학생들은 커피를 선호하였다. 나이별로는 18세에서 24세 사이의 대학생들이 보통탄산음료를 선호하는 반면 25세에서 39세의 경우는 주로 식이탄산음료를 선택하는 것으로 나타났다. 이상의 연구결과는 최근 음료수의 소비성향에 크게 영향을 미치는 대학생에 대한 음료수의 시장판매와 광고선전에 올바른 전략을 인지시킬 수 있을 뿐만 아니라 영양교육에 도움이 될 수 있다.