



Non-Parametric Study Of Knowledge, Attitude And Practice About Cosmetics Usage Among The University Students

A. Vani^{1*}, K. Manjula², M. Siva Parvathi³

Abstract

Back ground: Cosmetics are an essential aspect of daily life and are heavily promoted by culture and society. However, there is a lack of understanding of the safety concerns and risks involved with the usage of these rapidly evolving goods. The ingredients utilised in the manufacture of cosmetics are likewise rapidly changing. This circumstance necessitates public education initiatives to educate consumers about these risks and the importance of using cosmetics concurrently. Methods: The research is a cross-sectional observational study of 300 university students based on their knowledge, attitude, and practise. This study was carried out between December 2021 and February 2022. The variables investigated focused mostly on student behaviour and opinions. The Mann Whitney U test and the Kruskal wallis test were utilised as statistical tests. Results: The results of the analysis indicates that there is a significant difference in the medians and we found There were significant difference between knowledge, attitude and practice Groups which is observed the differences at 5%level of significance.

Keywords- Cosmetics, Mann Whitney U test, Kruskal wallis test, SPSS.

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1. INTRODUCTION

Cosmetics history has changed dramatically over the last few decades. The global cosmetic market was worth approximately 460 billion USD in 2014, and it is expected to reach 675 billion USD by 2020, growing at a 6.4 percent annual rate. The beauty market has expanded at a rate of 4.5 percent each year on average, with yearly growth rates ranging from 3 to 5 percent. During the nineteenth century, France devised a chemical procedure to replace the aroma provided by natural processes. During the twentieth century, make-up grew popular in the United States and Europe. The modern period of the cosmetics industry began in 1950, although yearly revenues did not reach \$ 20 million until 1980. At the close of the 1990s,

the worldwide cosmetic market experienced a modest slowdown. Cosmetics and toiletry retail sales decreased to 166.2 billion USD in 1998, from 171.5 billion in 1997. The early twentieth century was remembered as the most fascinating period in the history of cosmetics. During the twentieth century, the cosmetics sector increased dramatically in popularity.

Cosmetics were first freely offered in the early twentieth century. By the mid-twentieth century, cosmetics were widely utilised by women in practically all industrial societies around the world. The cosmetic industry in the twenty-first century was not only centred on women, but also gave the metro male population the opportunity to improve their

***Corresponding Author:-** A. Vani

Address:- ^{1*}Department of Statistics, Sri Padmavati Mahila Visvavidyalayam, Tirupati, Andhra Pradesh, India, Email: akkyamvani1@gmail.com

²Assistant Professor, Department of Applied mathematics, Sri Padmavati Mahila Visvavidyalayam, Tirupati, Andhra Pradesh, India, Email: manjula.karre77@gmail.com

³Assistant Professor, Department of Applied mathematics, Sri Padmavathi Mahila Visvavidyalayam, Tirupati, Andhra Pradesh, India. Email: parvathimani2008@gmail.com

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face look. The worldwide cosmetic sector is currently confronted with enormous demand and obstacles in producing high quality cosmetic products. Consumers' awareness of hygiene and attractiveness has expanded in recent years as a result of technology improvements, globalisation, and increasing purchasing power, which is the fundamental cause for the cosmetic industry's rapid development. Cosmetics are generally used to enhance and protect the appearance of the skin and body.

Beauty culture and cosmetics have their roots in the early twentieth century. The expansion of the Indian cosmetics market has increased Indians' awareness of their appearance and demand for cosmetic items. As a result, today's women fervently believe that looking stunning, charming, appealing, and presentable is necessary and fantastic. This review focuses on the impact of socioeconomic variables on purchasing behaviour, cosmetic user consumption patterns, motivations for using cosmetics, and user happiness. Studies relating to the behaviour and attitude of females in the purchase and use of cosmetics, Studies relating to the reasons for the purchase and use of cosmetics, Studies relating to the factors that influence the purchase of cosmetic products, Studies on Socio-economic factors that influence the buying behaviour. Skincare, hair care, nail care, personal care, makeup, and perfumes are all examples of cosmetics. Cosmetics are preparations that are applied to the human body for washing, beautifying, enhancing beauty, or altering appearance without causing harm to the body's structure or functions. The increasing demand of consumers' desire to be "good looking" and little societal awareness towards safety of these products has resulted in increasing cosmetics utilization .

Makeup is used as a beauty tool to increase a person's self-esteem and confidence. Cosmetics have grown in popularity as more people strive to appear young and appealing. Recently, anti-aging treatments that can keep skin looking younger for many years have been discovered. The most effective cleaning products include cleansing cream, soap, and water. Cosmetic creams are used to moisturise rough, dry, or chapped skin. Many beauty product manufacturers have capitalised on

people's need to protect themselves and their skin from the sun's rays. This is a big achievement because make-up and sun protection could not previously be combined. The Importance of Cosmetics Cosmetics today can help us improve our appearance and boost our confidence. Cosmetics are clearly crucial in our daily lives, with more on the market than ever before.

Similar studies were reported by us on KAP of cosmetics using a descriptive statistics and cross tabulation, where our study showed that there is a significant difference between age to knowledge and Practice. But it is not significance between age and attitude [5]. However the current study, we have performed Mann Whitney U statistic and Kruskal-Wallis test to understand the significance difference between the variables.

The test here we are using, it is a non-parametric method for determining whether or not samples come from the same distribution. It is used to compare two or more independent samples of the same or different size. It expands on the Mann-Whitney U test, which is only used to compare two groups. The one-way analysis of variance is the Kruskal-Wallis test's parametric equivalent (ANOVA). In the case of Education, we found there is significant difference among three groups.

We are considering the Mann Whitney U statistic and to calculate this we need to consider the sums of the rankings and compare them with what we would expect if these two groups came from the same distribution. We consider each group in turn and work out for each group a U statistic. The formula here is the sum of the ranks - $N \times (N+1)/2$ for each group. The Kruskal-Wallis test is a nonparametric approach to the one-way ANOVA. The procedure is used to compare three or more groups on a dependent variable that is measured on at least an ordinal level. here we are comparing three groups knowledge, Attitude, Practice

2. Methods

2.1 Study Design

This study was an observational study with a cross-sectional design that collected general data from students,



including Age, Education, Family size and Family income. Furthermore, the data collected include knowledge, attitude and practice.

2.2 Sources of data

The study's data were gathered from primary sources. The primary data were gathered from the sample respondents via a structured interview schedule in order to assess the opinions and attitudes of female cosmetic customers. The information was acquired utilising Google forms among UG and PG students using the Whatsapp app and E-mail. Respondents reviewed the research subject explanation page at the beginning of the data form and completed all of the questions on the Google form if they agreed. If the research subject did not agree, they did not completely fill out the Google form, and the data was not recorded. The research subjects were drawn at random from a pool of students and distributed over a three-month period with a link.

2.3 Participants and Data collection

We collected information from 300 students at Sri Padmavati Mahila Visvavidyalayam and Sri Padmavati Women's Degree College in Tirupati using an online Google form and an offline survey. As previously stated, a systematic, standardised questionnaire is used to collect data for a KAP survey, which may include quantitative and qualitative data as well as observations. The survey objectives and questions to be answered

dictate the sorts of data to be collected. During the survey period, the survey crew should perform daily quality control of data collecting. The mode of data collection (e.g., paper questionnaire, smart phone, tablet) should be chosen based on the practicality of the survey region, available resources for training and supplies, and the availability of technological assistance in the field throughout the survey period. Data backup modes must be defined (e.g. paper forms for smart phones).

2.4 Period of study

In the current study, primary sources of data on female behavior were collected over a three-month period from December 2021 to February 2022.

2.5 KAP

A Knowledge, Attitude and Practice survey is method for gathering quantitative and qualitative data. In this study there are 13 questions related to knowledge on cosmetic products, 7 questions about an Attitude and 8 questions under their practices on cosmetic products survey. Through this data are calculated an association between their knowledge, Attitude and Practice of the survey.

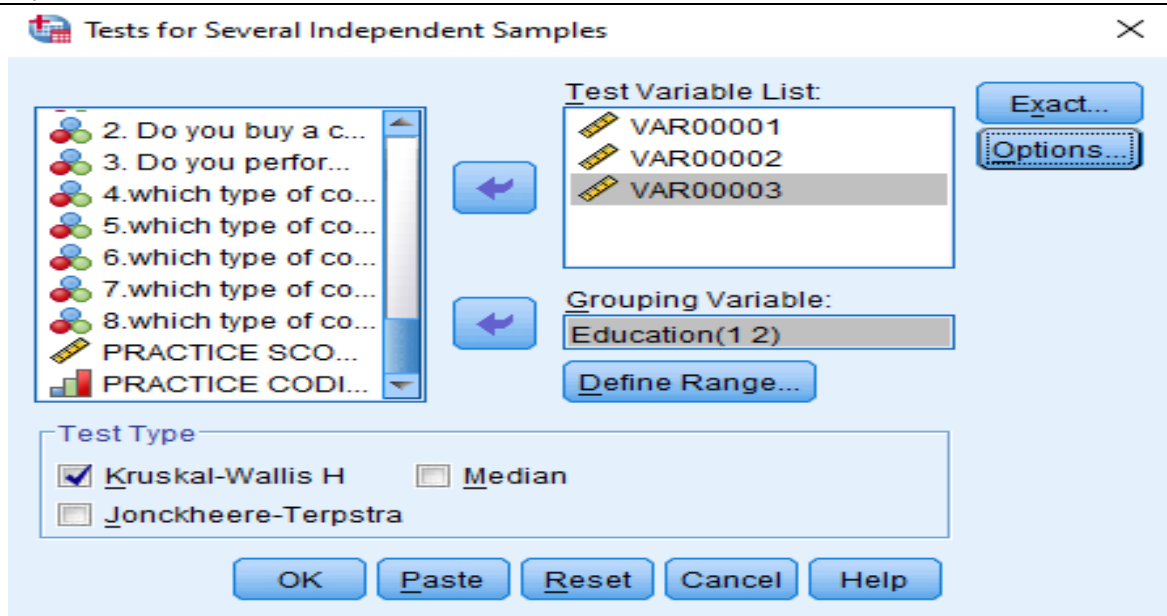
3. Results and Discussions

The statistical programme IBM SPSS Version 2.0 was used in this study. To analyse the relationship of each categorical parameter.

The screenshot shows the IBM SPSS software interface. The 'Analyze' menu is open, and 'K Independent Samples...' is selected. The main window displays a data table with columns for 'Education', 'FamilyIncome', and '@1.Whatis'. The data table has 24 rows and 3 columns. The 'Education' column has values 1, 2. The 'FamilyIncome' column has values 1, 1, 1, 2, 1, 2, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1. The '@1.Whatis' column has values 1, 1, 1, 2, 1, 2, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1.

10 : Numberoffamilyme...	@ Age	Gender	Education	FamilyIncome	@1.Whatis
1	1		1	1	1
2	1		1	1	1
3	2		1	2	1
4	2		1	1	1
5	2		2	1	1
6	1		1	2	1
7	2		1	1	1
8	2		2	1	1
9	2		2	1	1
10	2		1	1	1
11	1		1	1	1
12	2		1	1	1
13	1		1	1	1
14	2		1	1	1
15	2		1	1	1
16	1		1	1	1
17	2		1	1	1
18	1		1	1	1
19	1		1	1	1
20	1		1	1	1
21	1		1	1	1
22	2		2	2	1
23	1		2	1	1
24	1		2	1	1





Descriptive Statistics					
	N	Mean	Std. Deviation	Minimum	Maximum
CODING	900	2.14	.697	1	3
GROUP1	900	2.00	.817	1	3

Kruskal-Wallis Test

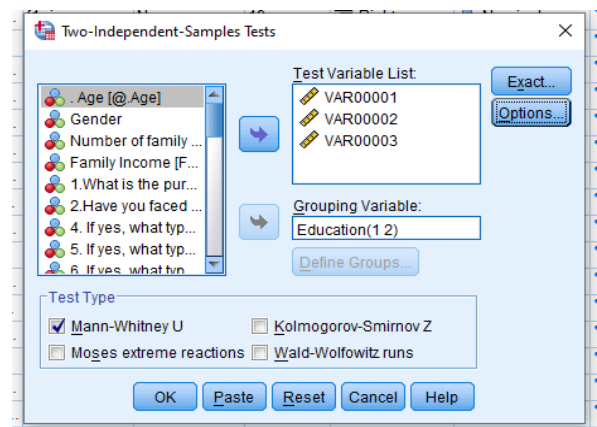
Ranks			
GROUP1		N	Mean Rank
CODING	KNOWLEDGE	300	437.42
	ATTITUDE	300	519.29
	PRACTICE	300	394.80
	Total	900	

Test Statistics^{a,b}

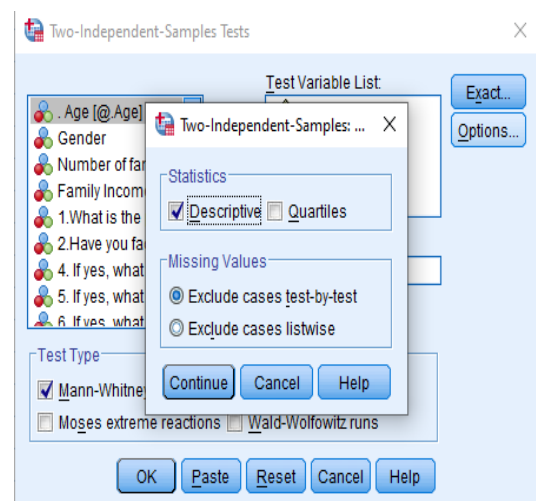
	CODING
Chi-Square	42.387
Df	2
Asymp. Sig.	.000
a. Kruskal Wallis Test	
b. Grouping Variable: GROUP1	

The variables here VAR00001, VAR00002, VAR00003 are the codings for KAP scorings which discriminates codes as Poor, Average, Good according to the scorings. The results of the analysis indicates that there is a significant difference in the medians, $\chi^2(2, N = 300) = 42.387, p = .000$. Because the overall test is significant, pairwise comparisons among the three groups should be completed.

The Mann-Whitney U test is used to compare differences between two independent groups when the dependent variable is either ordinal or continuous, but not normally distributed.



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Descriptive Statistics					
	N	Mean	Std. Deviation	Minimum	Maximum
Knowledge	300	2.11	.567	1	3
Attitude	300	2.33	.691	1	3
Practice	300	1.96	.769	1	3
Education	300	1.49	.501	1	2



Mann-Whitney Test

		Ranks		
Education		N	Mean Rank	Sum of Ranks
knowledge	undergraduate	154	158.77	24450.00
	post graduate	146	141.78	20700.00
	Total	300		
Attitude	undergraduate	154	166.09	25578.00
	post graduate	146	134.05	19572.00
	Total	300		
Practice	undergraduate	154	131.12	20192.00
	post graduate	146	170.95	24958.00
	Total	300		

Test Statistics ^a			
	Knowledge	Attitude	Practice
Mann-Whitney U	9969.000	8841.000	8257.000
Wilcoxon W	20700.000	19572.000	20192.000
Z	-2.039	-3.509	-4.239
Asymp. Sig. (2-tailed)	.041	.000	.000

a. Grouping Variable: Education

The output here consists of test statistics and their significance as calculated in several ways. We are considering the Mann Whitney U statistic and to calculate this we need to consider the sums of the rankings and compare them with what we would expect if these two groups came from the same distribution. We consider each group in turn and work out for each group a U statistic. The formula here is the sum of the ranks - $N \times (N+1)/2$ for each group. So for Education category Under graduate we have $U1 = 24450.00 - 154 \times (154+1)/2 = 12515.00$ and for Education category Postgraduate we have $U2 = 20700.00 - 146 \times (146+1)/2 = 9969.00$ Here $U1$ is less than $U2$ and it is the lower of the two U statistics that we report when giving the results. So here the value 9969.00 is the U test statistic as shown in the table.

The output here consists of test statistics and their significance as calculated for attitude, We consider each group in turn and work out for each group a U statistic. The formula here is the sum of the ranks - $N \times (N+1)/2$ for each group. So for Education category Under graduate we have $U1 = 25578.00 - 154 \times (154+1)/2 = 13643$ and for Education category Postgraduate we have $U2 = 19572.00 - 146 \times (146+1)/2 = 8841.00$ Here $U1$ is less than $U2$ and it is the lower of the two U statistics that we report when giving the results. So here the value 8841.00 is the U test statistic as shown in the table.

The output here consists of test statistics and their significance as calculated for practice. We consider each group in turn and work out for each group a U statistic. The formula here is

the sum of the ranks - $N \times (N+1)/2$ for each group. So for Education category Under graduate we have $U1 = 20192.00 - 154 \times (154+1)/2 = 8257.00$ and for Education category Postgraduate we have $U2 = 24958.00 - 146 \times (146+1)/2 = 14227$ Here $U1$ is less than $U2$ and it is the lower of the two U statistics that we report when giving the results. So here the value 8257.00 is the U test statistic as shown in the table.

A related approach that uses ranks is the Wilcoxon W statistic which is quoted here and is the maximum of the two rank sums but it is less used than the Mann-Whitney so we do not describe it further. One way to interpret the Mann-Whitney U statistic is to convert it to a normal score by subtracting its mean and dividing by its standard error and that is done in the Z row. Here we see that $Z = -2.039$, $Z = -3.509$, $Z = -4.239$ and this can be compared with a standard normal distribution to get a sense of the magnitude by which the groups differ. Here we see that the p value, quoted next to Asymp. Sig. (2-tailed), is .000 (reported as $p < .001$) which is less than 0.05. We therefore have significant evidence to reject the null hypothesis.

In this case, Education category undergraduate has a higher mean rank than Education category postgraduate. The normal approximation used above is only an approximation to the p value and SPSS offers a computational procedure to construct an exact p value. However in this case, the sample sizes are so large that the exact test was too computationally-intensive to complete, although the asymptotic p value should be accurate enough. In conclusion, we could report this to a reader as follows.

A comparison of the mean of the distribution of the variable Knowledge was desired for Education categories Undergraduate and post graduate but due to the non-normality of the variable a Mann Whitney test was carried out. Education category Undergraduate (N= 154) has a larger mean rank (158.77) than Education category Postgraduate (N= 146) with mean rank (141.78) and thus tends to take larger values. A statistically significant difference was found ($U = 9969.000$, $p < .005$).

A comparison of the mean of the distribution of the variable Attitude was desired for Education categories Undergraduate and post graduate



but due to the non-normality of the variable a Mann Whitney test was carried out. Education category Undergraduate (N= 154) has a larger mean rank (166.09) than Education category Postgraduate (N= 146) with mean rank (134.05) and thus tends to take larger values. A statistically significant difference was found ($U = 8841.000, p < .005$).

A comparison of the mean of the distribution of the variable Practice was desired for Education categories Undergraduate and post graduate but due to the non-normality of the variable a Mann Whitney test was carried out. Education category Postgraduate (N= 146) with mean rank (170.95) than Education category Undergraduate (N= 154) has a larger mean rank (131.12) and thus tends to take larger values. A statistically significant difference was found ($U = 8257.000, p < .005$).

4. Conclusions:

The results of the analysis indicates that there is a significant difference in the medians, $\chi^2(2, N = 300) = 42.387, p = .000$. Because the overall test is significant, pair wise comparisons among the three groups should be completed. The results of Manwhitney U test shows For KNOWLEDGE, A statistically significant difference was found ($U = 9969.000, p < .005$), For ATTITUDE, A statistically significant difference was found ($U = 8841.000, p < .005$), For PRACTICE, A statistically significant difference was found ($U = 8257.000, p < .005$). Hence there is significant difference between three groups.

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