# Chapter – 4

# Results

# Results

## 4.0 Introduction

The chapter comprises testing hypotheses with an application of various statistical techniques using a software SPSS 25 in answering the research questions and testing the hypotheses that were initially developed at the commencement of the study following literature review as refereed in approved synopsis and included in Chapter 3 along with the objectives of the study.

Review of data collected provided an opportunity to perform additional statistical tests not just limiting to answering the initially developed research questions / hypotheses but by looking at the perspectives from different dimensions to bring about insightfulness into the study.

## 4.1 Research Questions & Hypotheses

The study in its endeavor in fulfilment of the objectives is aimed at answering the research questions given in the Table 4.1

Table 4.1
Research Questions

| Sr. No. | Research Question |
|---|---|
| ***RQ 1*** | ***Does knowledge of generic medicines play a significant role in influencing doctors in prescribing generic medicines?*** |
| *RQ 1.1* | *Is there any difference in knowledge of generic medicines amongst doctors serving at primary, secondary and tertiary healthcare centers?* |
| *RQ 1.2* | *Is there any difference in knowledge of generic medicines between Male and Female doctors?* |
| *RQ 1.3* | *Is there any difference in knowledge of generic medicines amongst doctors in different age groups?* |
| *RQ 1.4* | *Is there any difference in knowledge of generic medicines amongst doctors who are self-employed, working with Govt. hospitals, and Pvt. Hospitals?* |
| *RQ 1.5* | *Is there any difference in knowledge of generic medicines amongst doctors qualified with UG Degree, PG Diploma/Degree, and Post PG Degree?* |
| *RQ 1.6* | *Is there any difference in knowledge of generic medicines amongst doctors having practice involving non-surgical and surgical treatment?* |
| *RQ 1.7* | *Is there any difference in knowledge of generic medicines amongst doctors in different experience groups?* |
| ***RQ 2*** | ***Does attitude towards generic medicines plays a significant role in influencing doctors in prescribing generic medicines?*** |
| *RQ 2.1* | *Is there any difference in attitude towards generic medicines amongst doctors serving at primary, secondary and tertiary hospitals?* |
| *RQ 2.2* | *Is there any difference in attitude towards generic medicines between Male and Female doctors?* |
| *RQ 2.3* | *Is there any difference in attitude towards generic medicines amongst doctors in different age groups?* |
| *RQ 2.4* | *Is there any difference in attitude towards generic medicines amongst doctors who are self-employed, working with Govt. hospitals, and Pvt. Hospitals?* |
| *RQ 2.5* | *Is there any difference in attitude towards generic medicines amongst doctors qualified with UG Degree, PG Diploma/Degree, and Post PG Degree?* |
| *RQ 2.6* | *Is there any difference in attitude towards generic medicines amongst doctors having practice involving non-surgical and surgical treatment?* |
| *RQ 2.7* | *Is there any difference in attitude towards generic medicines amongst doctors in different experience groups?* |
| ***RQ 3*** | ***Does practice of doctors* play *a significant role in influencing them in prescribing generic medicines?*** |
| *RQ 3.1* | *Is there any difference in practice amongst doctors serving at primary, secondary and tertiary hospitals?* |
| *RQ 3.2* | *Is there any difference in practice between Male and Female doctors?* |
| *RQ 3.3* | *Is there any difference in practice amongst doctors in different age groups?* |
| *RQ 3.4* | *Is there any difference in practice amongst doctors who are self-employed, working with Govt. hospitals, and Pvt. Hospitals?* |
| *RQ 3.5* | *Is there any difference in practice amongst doctors qualified with UG Degree, PG Diploma/Degree, and Post PG Degree?* |
| *RQ 3.6* | *Is there any difference in practice amongst doctors giving non-surgical and surgical treatment?* |
| *RQ 3.7* | *Is there any difference in practice amongst doctors in different experience groups?* |
| ***RQ 4*** | ***Is there any difference in practice of prescribing generic medicines amongst doctors serving at primary, secondary and tertiary healthcare centers?*** |
| ***RQ 5*** | ***Does Knowledge (cognitive) of generic medicine, Attitude (affective) towards generic medicine and Practice (conative) have a significant influence on doctors in prescribing generic medicines)?*** |

## 4.2 Normality Test

The data was first tested for normality to enable take a decision as to use of Parametric tests or non-Parametric tests.

Numerical & visual outputs of following tests were investigated results of which are summarized below.

### 4.2.1 Skewness & Kurtosis z-values

Skewness & Kurtosis z-values of 16 items were found to be having both the values outside the range -1.96 to 1.96 and 19 items were found either skewness or kurtosis outside the range indicating the data is highly skewed and Kurtotic, differs significantly from normality as detailed in Table 4.2.

Hence, skewness and kurtosis indicate that the data is not normally distributed.

Table 4.2
Skewness & Kurtosis z-values

| | Skewness | | | Kurtosis | | |
|---|---|---|---|---|---|---|
| | Statistic | Std. Error | Z Value | Statistic | Std. Error | Z Value |
| *Composition, dose and indications of generics same as branded / innovator medicine* | -1.067 | 0.161 | -6.63 | 1.072 | 0.321 | 3.34 |
| *Therapeutically equivalence of generics* | -0.107 | 0.161 | -0.66 | -1.204 | 0.321 | -3.75 |
| *Interchangeability of innovator/branded drug with generics* | -0.811 | 0.161 | -5.04 | -0.27 | 0.321 | -0.84 |
| *Generics introduction after patent expiry of innovator* | 0.031 | 0.161 | 0.19 | -1.048 | 0.321 | -3.26 |
| *Jan Aushadhi Awareness* | 0.383 | 0.162 | 2.36 | -1.249 | 0.322 | -3.88 |
| *IMA Guidelines Awareness for generic prescribing* | -0.839 | 0.161 | -5.21 | 2.644 | 0.321 | 8.24 |
| *Bioequivalence of generic to brand* | -0.179 | 0.161 | -1.11 | -1.005 | 0.321 | -3.13 |
| *Comparative effectiveness of all generics with branded drugs* | 0.131 | 0.162 | 0.81 | -1.177 | 0.322 | -3.66 |
| *Comparative effectiveness of generics at Jan Aushadhi with branded drugs* | -0.182 | 0.161 | -1.13 | -0.363 | 0.321 | -1.13 |
| *MNCs quality of medicines better than local companies* | 0.187 | 0.161 | 1.16 | -1.162 | 0.321 | -3.62 |
| *Limited reputable local generic drug companies* | 1.089 | 0.161 | 6.76 | 1.359 | 0.321 | 4.23 |
| *Branded medicines have higher safety standards* | 0.347 | 0.161 | 2.16 | -0.992 | 0.321 | -3.09 |
| *Influence on prescription by promotion of drug companies* | 0.053 | 0.162 | 0.33 | -1.296 | 0.322 | -4.02 |
| *Need of education about generic medicines* | -1.048 | 0.161 | -6.51 | 1.151 | 0.321 | 3.59 |
| *Greater role by pharmacists as advisors on generic medicines* | -0.188 | 0.161 | -1.17 | -1.27 | 0.321 | -3.96 |
| *Hospital budget affects choice of medicine* | -0.628 | 0.162 | -3.88 | -0.436 | 0.322 | -1.35 |
| *Need for confidence building for generic medicines amongst doctors* | -0.842 | 0.161 | -5.23 | 2.645 | 0.321 | 8.24 |
| *Variation in manufacturing standards between generics and brands* | -0.166 | 0.161 | -1.03 | -0.91 | 0.321 | -2.83 |

| | Skewness | | | Kurtosis | | |
|---|---|---|---|---|---|---|
| | Statistic | Std. Error | Z Value | Statistic | Std. Error | Z Value |
| *Price-Quality parity of generic drugs* | -0.249 | 0.161 | -1.55 | -1.059 | 0.321 | -3.30 |
| *Price- Quality parity of generics at Jan Aushadhi* | -0.142 | 0.161 | -0.88 | -0.651 | 0.321 | -2.03 |
| *Rewards to doctors for prescribing generics* | -0.842 | 0.161 | -5.23 | 0.147 | 0.321 | 0.46 |
| *Substitution of branded drugs with generics* | 0.29 | 0.161 | 1.80 | -0.994 | 0.321 | -3.10 |
| *Liberty to choose generics by patient* | -0.981 | 0.161 | -6.09 | 0.312 | 0.321 | 0.97 |
| *Prescribing generic drugs* | -0.012 | 0.161 | -0.07 | -0.861 | 0.321 | -2.68 |
| *Hesitation in prescribing in some diseases* | 0.845 | 0.161 | 5.25 | 0.134 | 0.321 | 0.42 |
| *Influence of personal experiences with medicines* | -1.207 | 0.161 | -7.50 | 4.322 | 0.321 | 13.46 |
| *Influence by patients' demands)* | -0.317 | 0.161 | -1.97 | -1.147 | 0.321 | -3.57 |
| *Consideration of socioeconomic status of patients for prescribing medicines* | 1.1 | 0.161 | 6.83 | 0.748 | 0.321 | 2.33 |
| *Easy remembrance of brand names* | -0.806 | 0.162 | -4.98 | 0.147 | 0.322 | 0.46 |
| *Influence of medical reps* | -0.627 | 0.162 | -3.87 | -0.661 | 0.322 | -2.05 |
| *Availability of medicines* | -1.464 | 0.161 | -9.09 | 6.216 | 0.321 | 19.36 |
| *Outcome of therapy with switching from brands to generics* | 0.089 | 0.162 | 0.55 | -1.09 | 0.322 | -3.39 |
| *Comparison of safety & efficacy of generic vs. brand name medicines* | 0.879 | 0.162 | 5.43 | -0.242 | 0.323 | -0.75 |

### 4.2.2 Kolmogorov-Smirnov & Shapiro-Wilk test

Kolmogorov-Smirnov & Shapiro-Wilk test were found having p-value less than .05 details of which are given in Table 4.3. Significant difference in normal distribution is found, thus rejecting the null hypothesis. In terms of Kolmogorov-Smirnov & Shapiro-Wilk tests, it can be assumed that the data is not normally distributed.

Table 4.3
Kolmogorov-Smirnov & Shapiro-Wilk test

| | Kolmogorov-Smirnov[a] | | | Shapiro-Wilk | | |
|---|---|---|---|---|---|---|
| | Statistic | df | Sig. | Statistic | df | Sig. |
| *Composition, dose and indications of generics same as branded / innovator medicine* | 0.371 | 228 | 0.000 | 0.773 | 228 | 0.000 |
| *Therapeutically equivalence of generics* | 0.266 | 228 | 0.000 | 0.849 | 228 | 0.000 |
| *Interchangeability of innovator/branded drug with generics* | 0.366 | 228 | 0.000 | 0.782 | 228 | 0.000 |
| *Generics introduction after patent expiry of innovator* | 0.230 | 228 | 0.000 | 0.880 | 228 | 0.000 |
| *Jan Aushadhi Awareness* | 0.319 | 227 | 0.000 | 0.819 | 227 | 0.000 |
| *IMA Guidelines Awareness for generic prescribing* | 0.365 | 228 | 0.000 | 0.701 | 228 | 0.000 |
| *Bioequivalence of generic to brand* | 0.254 | 228 | 0.000 | 0.872 | 228 | 0.000 |
| *Comparative effectiveness of all generics with branded drugs* | 0.264 | 227 | 0.000 | 0.856 | 227 | 0.000 |
| *Comparative effectiveness of generics at Jan Aushadhi with branded drugs* | 0.209 | 228 | 0.000 | 0.888 | 228 | 0.000 |
| *MNCs quality of medicines better than local companies* | 0.276 | 228 | 0.000 | 0.849 | 228 | 0.000 |
| *Limited reputable local generic drug companies* | 0.407 | 228 | 0.000 | 0.708 | 228 | 0.000 |
| *Branded medicines have higher safety standards* | 0.289 | 228 | 0.000 | 0.857 | 228 | 0.000 |
| *Influence on prescription by promotion of drug companies* | 0.259 | 227 | 0.000 | 0.848 | 227 | 0.000 |
| *Need of education about generic medicines* | 0.354 | 228 | 0.000 | 0.767 | 228 | 0.000 |
| *Greater role by pharmacists as advisors on generic medicines* | 0.285 | 228 | 0.000 | 0.850 | 228 | 0.000 |
| *Hospital budget affects choice of medicine* | 0.322 | 226 | 0.000 | 0.838 | 226 | 0.000 |
| *Need for confidence building for generic medicines amongst doctors* | 0.357 | 228 | 0.000 | 0.701 | 228 | 0.000 |

| | Kolmogorov-Smirnov[a] | | | Shapiro-Wilk | | |
|---|---|---|---|---|---|---|
| | Statistic | df | Sig. | Statistic | df | Sig. |
| *Variation in manufacturing standards between generics and brands* | 0.237 | 228 | 0.000 | 0.867 | 228 | 0.000 |
| *Price-Quality parity of generic drugs* | 0.279 | 228 | 0.000 | 0.851 | 228 | 0.000 |
| *Price- Quality parity of generics at Jan Aushadhi* | 0.223 | 228 | 0.000 | 0.874 | 228 | 0.000 |
| *Rewards to doctors for prescribing generics* | 0.320 | 228 | 0.000 | 0.824 | 228 | 0.000 |
| *Substitution of branded drugs with generics* | 0.278 | 228 | 0.000 | 0.864 | 228 | 0.000 |
| *Liberty to choose generics by patient* | 0.365 | 228 | 0.000 | 0.786 | 228 | 0.000 |
| *Prescribing generic drugs* | 0.210 | 228 | 0.000 | 0.890 | 228 | 0.000 |
| *Hesitation in prescribing in some diseases* | 0.351 | 228 | 0.000 | 0.809 | 228 | 0.000 |
| *Influence of personal experiences with medicines* | 0.360 | 228 | 0.000 | 0.678 | 228 | 0.000 |
| *Influence by patients' demands)* | 0.305 | 228 | 0.000 | 0.835 | 228 | 0.000 |
| *Consideration of socioeconomic status of patients for prescribing medicines* | 0.344 | 228 | 0.000 | 0.784 | 228 | 0.000 |
| *Easy remembrance of brand names* | 0.348 | 227 | 0.000 | 0.802 | 227 | 0.000 |
| *Influence of medical reps* | 0.327 | 227 | 0.000 | 0.812 | 227 | 0.000 |
| *Availability of medicines* | 0.408 | 228 | 0.000 | 0.605 | 228 | 0.000 |
| *Outcome of therapy with switching from brands to generics* | 0.239 | 227 | 0.000 | 0.863 | 227 | 0.000 |
| *Comparison of safety & efficacy of generic vs. brand name medicines* | 0.392 | 225 | 0.000 | 0.741 | 225 | 0.000 |
| *Awareness seminars to prescribe generic drugs* | 0.390 | 228 | 0.000 | 0.700 | 228 | 0.000 |
| *Published Literature on generic drugs* | 0.361 | 227 | 0.000 | 0.679 | 227 | 0.000 |
| *Mandatory prescribing of generics* | 0.298 | 228 | 0.000 | 0.859 | 228 | 0.000 |

### 4.2.3 Histograms, Normal Q-Q Plots and Box Plots

Of the 36 items, only 11 items were seen to be somewhat close to bell shape curve and the majority were of no match with the bell shape curve as can be seen in Appendix C. Therefore, the data cannot be assumed to be normally distributed by Histograms, Normal Q-Q Plots, and Box Plots.

Accordingly, it may be concluded as per the findings of the normality tests, the data cannot be assumed to be normally distributed. Hence, Non-Parametric tests have been applied.

## 4.3 Application of Statistical Tools

Summary of outcome of non-Parametric statistical tools applied in answering the listed research questions including interpretation are detailed below along with acceptance / rejection of null / alternate hypothesis.

#### 4.3.1 Response to knowledge items & prescribing generic medicines

The frequency of respondent responses to knowledge-related questions is shown in Table 4.4 & to prescribing generic medicines in Table 4.4A

Table 4.4
Knowledge related statements along with frequency (numbers & %) of responses

| Statement | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|---|---|---|---|---|
| *Composition, dose and indications of generic medicines are same as branded / innovator medicine.* | 3 | 24 | 22 | 143 | 36 |
| | 1.3% | 10.5% | 9.6% | 62.7% | 15.8% |
| *All generic products of a particular medicine that are rated as generic equivalents are therapeutically equivalent to each other.* | 8 | 78 | 36 | 93 | 13 |
| | 3.5% | 34.2% | 15.8% | 40.8% | 5.7% |
| *Generic drugs are usually intended to be interchangeable with an innovator / branded drug.* | 5 | 44 | 27 | 136 | 16 |
| | 2.2% | 19.3% | 11.8% | 59.6% | 7.0% |
| *Generic drugs can be only marketed after the expiry date of the patent of innovator.* | 8 | 72 | 49 | 81 | 18 |
| | 3.5% | 31.6% | 21.5% | 35.5% | 7.9% |
| *I have limited awareness about the Jan-Aushadhi scheme of Government of India.* | 27 | 63 | 14 | 111 | 12 |
| | 11.9% | 27.8% | 6.2% | 48.9% | 5.3% |
| *I am aware of Indian Medical Council guidelines to prescribe medicines by generic names in place of brand names.* | 0 | 7 | 16 | 163 | 42 |
| | 0.0% | 3.1% | 7.0% | 71.5% | 18.4% |
| *A generic medicine is bioequivalent to a brand name medicine.* | 8 | 66 | 48 | 91 | 15 |
| | 3.5% | 28.9% | 21.1% | 39.9% | 6.6% |

*Source*: Author Compilation

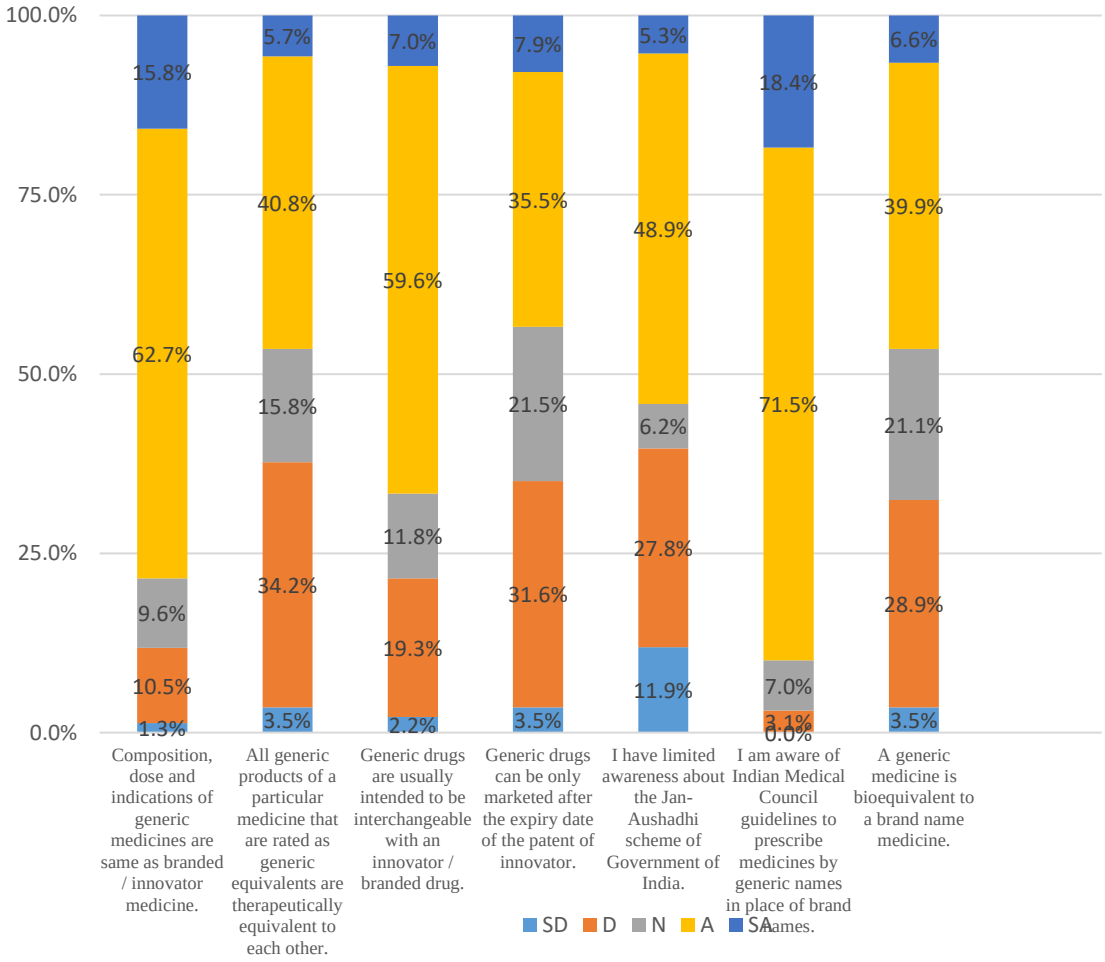



Figure 4.1 Graphic representation of knowledge-related responses

A majority of doctors (78.5%) agreed to having information about dosage, composition and indications of generic drugs being identical to branded or innovator medications. 46.5% of respondents have the knowledge on therapeutically equivalence with each other of all generics. The majority of doctors (66.7%) know that generics can be interchanged with innovator / branded medicines. Less than 50% of doctors (43.4 %) are aware that generic drugs can only be introduced after the patent expires. 54.2% of doctors know little or nothing of Jan Aushadhi scheme. 89.9% of doctors are

aware of the guidelines given by IMC to prescribe medicines by generic names. Less than 50% of the doctors (46.4%) know that generic drugs are bioequivalent to brand-name medicines.

**Responses to prescribing generic medicines is shown in Table 4.4A**.

Table 4.4A
Responses (frequency & %) of doctors in prescribing generic drugs

| Statement | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|---|---|---|---|---|
| I usually prescribe generic drugs | 6 | 64 | 66 | 76 | 16 |
| | 2.6% | 28.1% | 28.9% | 33.3% | 7.0% |

#### 4.3.1.1 Influence of knowledge on doctors in prescribing generic medicines

With an aim to find out the statistical significance between knowledge of generic medicines and prescription, a research question was framed.

***RQ 1: Does knowledge of generic medicines play a significant role in influencing doctors in prescribing generic medicines?***

To evaluate the statistical significance between knowledge (generic medicines) and prescription, Spearman's Rank Correlation Coefficient was computed.

Correlation between the two variables was found to be positive, $r = .411$, $N = 227$, $p < .001$ indicating significant moderate association between knowledge of generic medicines in doctors and prescription of generic medicines. Thus, the finding supports that knowledge of generic medicines has a significant influence on doctors' prescribing generic medicines. Spearman test results are summarized in Table 4.5

Table 4.5
Spearman Test Results (knowledge)

| | | | Knowledge items | Prescription of generic medicines |
|---|---|---|---|---|
| Spearman's rho | Knowledge items | Correlation Coefficient | 1.000 | .411** |
| | | Sig. (2-tailed) | | 0.000 |
| | | N | 227 | 227 |
| | Prescription of generic medicines | Correlation Coefficient | .411** | 1.000 |
| | | Sig. (2-tailed) | 0.000 | |
| | | N | 227 | 228 |

**. Correlation is significant at the 0.01 level (2-tailed).

The findings of the study have similarity and contrast to another study that was conducted to explore generic drug awareness among doctors at a teaching hospital (Gupta et al. 2018). Majority of the doctors in both the studies had agreed to intended interchangeability of brands with generic medicines and composition, dose, and indications of generics being same as branded medicine. However, contra response was observed in marketing of generics after patent expiry of innovator product wherein majority of the doctors in the present study had given a contra or neutral response indicating inadequate knowledge, also awareness of Jan-Aushadhi scheme in the present study was found to be low. Better awareness of generics in a tertiary care teaching hospital may be due to more focus on generics being a government medical college. The response, 89.9% of doctors being aware of IMC guidelines to prescribe medicines by generic names, has been found to be higher as compared with the response of 73.5% in another study on evaluation of knowledge, attitude, and practice for use of generic drugs at tertiary care hospital (Kamejaliya et al., 2017) where the doctors were aware of regulations and law enforcement about generic prescription. The finding of the present study was similar to another study to assess knowledge and

attitudes of the doctors, pharmacists, and patients toward the use of generic medicines in Turkey (Toklu et al., 2012) where it was found that the healthcare providers have inadequate knowledge of generic drugs. There is some similarity between the study on patients' and doctors' views and observations with generic substitution (Heikkilä et al., 2007), in which it was found that doctors had knowledge that generics can be interchangeable with innovators, but about half of them believed that interchangeable medicines are less safe and effective compared with branded medications.

#### 4.3.1.2 Knowledge amongst doctors at Healthcare Centers (primary, secondary, tertiary)

With an aim to find out the statistical significance between knowledge of generic medicines amongst doctors at healthcare centers (primary, secondary, tertiary) a research question was framed.

*RQ 1.1: Is there any difference in knowledge of generic medicines amongst doctors serving at primary, secondary and tertiary healthcare centers?*

Kruskal Wallis test was performed to examine the difference in knowledge amongst doctors at different healthcare centers. The responses from doctors were distributed into three groups as per their practice:

Group 1: Primary Healthcare Center

Group 2: Secondary Healthcare Center

Group 3: Tertiary Healthcare Center

The results showed no statistical significant difference amongst doctors at different healthcare centers (primary, secondary, tertiary) *H =.087, N = 227 p=.957*. The test results are given in Table 4.6

Thus, null hypothesis is accepted and it can be concluded that there is no difference in knowledge of generic medicines amongst doctors serving at primary, secondary and tertiary healthcare centers.

Table 4.6
Kruskal-Wallis test results (knowledge across healthcare centers)

| Test Statistics[a,b] | |
|---|---|
| | Knowledge Items |
| Kruskal-Wallis H | .087 |
| df | 2 |
| Asymp. Sig. | .957 |

a. Kruskal Wallis Test
b. Grouping Variable: Healthcare Center

#### 4.3.1.3 Knowledge of generic medicines in male and female doctors

*RQ 1.2: Is there any difference in knowledge of generic medicines between Male and Female doctors?*

Kruskal Wallis test showed no statistical significant difference in male and female doctors, *H = .582, N = 227, p=.446*. The test results are given in Table 4.7

Thus, null hypothesis is accepted establishing no significant difference in knowledge of generic medicines in male and female doctors.

Table 4.7
Kruskal-Wallis test results (knowledge across gender)

| Test Statistics[a,b] | |
|---|---|
| | Knowledge Items |
| Kruskal-Wallis H | .582 |
| df | 1 |
| Asymp. Sig. | .446 |

a. Kruskal Wallis Test
b. Grouping Variable: Gender

#### 4.3.1.4 Knowledge of generic medicines amongst doctors in different age groups

*RQ 1.3: Is there any difference in knowledge of generic medicines amongst doctors in different age groups?*

Kruskal-Wallis test showed statistical significant difference, $H = 10.276$, $N = 227$, $p = .036$. Test results are given in Table 4.8A

Based on the findings of the Kruskal-Wallis test, null hypothesis is rejected concluding there is significant difference in knowledge of generic medicines amongst doctors in different age groups. Highest variation is seen in mean rank scores amongst doctors in the age group 41 – 50 and doctors above the age of 60 years. Mean rank scores are given in Table 4.8B

Table 4.8 A
Kruskal-Wallis test results (knowledge across age groups)

| Test Statistics[a,b] | |
|---|---|
| | Knowledge Items |
| Kruskal-Wallis H | 10.276 |
| Df | 4 |
| Asymp. Sig. | .036 |

a. Kruskal Wallis Test
b. Grouping Variable: Age Group

Table 4.8 B
Mean Rank (knowledge across age groups)

| | Age Group | N | Mean Rank |
|---|---|---|---|
| Knowledge items | <30 | 4 | 106.63 |
| | 31-40 | 47 | 115.43 |
| | 41-50 | 59 | 91.66 |
| | 51-60 | 38 | 123.13 |
| | >60 | 79 | 125.82 |
| | Total | 227 | |

### 4.3.1.5 Knowledge of generic medicines amongst doctors in different employment status

*RQ 1.4: Is there any difference in knowledge of generic medicines amongst doctors who are self-employed, working with Govt. hospitals and Pvt. hospitals?*

Kruskal-Wallis test showed no statistical significant difference, *H = 4.313, N = 227, p = .116*. Test results are given in Table 4.9A

Thus, alternate hypothesis is rejected and it may be concluded that there is no significant difference in knowledge of generic medicines amongst doctors in different employment status. Variation in mean rank scores can be seen between doctors serving Govt. hospitals and self-employed / non-Govt. hospitals. Mean rank scores are given in Table 4.9B

Table 4.9A
Kruskal-Wallis test results (knowledge across categories of employment)

| Test Statistics[a,b] | |
|---|---|
| | Knowledge Items |
| Kruskal-Wallis H | 4.313 |
| df | 2 |
| Asymp. Sig. | .116 |

a. Kruskal Wallis Test
b. Grouping Variable: Employment

Table 4.9B
Mean Rank (knowledge across categories of employment)

| | Employment | N | Mean Rank |
|---|---|---|---|
| Knowledge items | Self-employed | 106 | 106.58 |
| | Govt. Hospital | 43 | 131.10 |
| | Pvt. Hospital | 78 | 114.65 |
| | Total | 227 | |

### 4.3.1.6 knowledge of generic medicines amongst doctors having different levels of qualification

*RQ 1.5: Is there any difference in knowledge of generic medicines amongst doctors qualified with undergraduate degrees, post-graduate diploma/degrees and post post-graduate degrees?*

Kruskal-Wallis test showed statistical significant difference, $H = 9.781$, $N = 227$, $p = .008$. Test results are given in Table 4.10A

Thus, null hypothesis is rejected and it may be concluded that there is significant difference in knowledge of generic medicines amongst doctors having different levels of qaulification. Mean rank variation can be seen varying from highest to lowest from UG degree holders to Post PG Degree in Table 4.10B

Table 4.10A
Kruskal-Wallis test results (knowledge across categories of qualification)

| Test Statistics[a,b] | |
|---|---|
| | Knowledge Items |
| Kruskal-Wallis H | 9.781 |
| df | 2 |
| Asymp. Sig. | .008 |

a. Kruskal Wallis Test
b. Grouping Variable: Qualification Categorization

Table 4.10B
Mean Rank (knowledge across categories of qualification)

| | Qualification Categorization | N | Mean Rank |
|---|---|---|---|
| Knowledge items | UG Degree | 27 | 148.98 |
| | PG Diploma / Degree | 183 | 110.70 |
| | Post PG Degree | 17 | 94.00 |
| | Total | 227 | |

### 4.3.1.7 Knowledge of generic medicines amongst doctors having non-surgical and surgical practice

*RQ 1.6: Is there any difference in knowledge of generic medicines amongst doctors having practice involving non-surgical and surgical treatment?*

Kruskal Wallis test revealed statistical significant difference $H = 5.611$, $N = 227$, $p = .018$ Test results are shown in Table 4.11A

Thus null hypothesis is rejected and it may be concluded that there is significant difference in knowledge of generic medicines amongst doctors having non-surgical and surgical practice. Doctors having non-surgical practice have a higher mean score indicating better knowledge of generics compared to doctors having surgical practice. Mean scores are given in the Table 4.11B

Table 4.11A
Kruskal-Wallis test results (knowledge across non-surgical & surgical practice)

| Test Statistics[a,b] | |
|---|---|
| | Knowledge Items |
| Kruskal-Wallis H | 5.611 |
| df | 1 |
| Asymp. Sig. | .018 |

a. Kruskal Wallis Test
b. Grouping Variable: Specialty Categorization

Table 4.11B
Mean Rank (knowledge across non-surgical and surgical practice)

| | Specialty Categorization | N | Mean Rank |
|---|---|---|---|
| Knowledge items | Non-Surgical | 128 | 123.04 |
| | Surgical | 99 | 102.31 |
| | Total | 227 | |

### 4.3.1.8 Knowledge of generic medicines amongst doctors in different experience groups

*RQ 1.7: Is there any difference in knowledge of generic medicines amongst doctors in different experience groups?*

Kruskal-Wallis test showed no statistical significant difference, *H = 4.192, N = 225, p = .381* Test results are given in Table 4.12A

Thus, null hypothesis is accepted and it may be concluded that there no is significant difference in knowledge of generic medicines amongst doctors in different experience groups. However, rising trend in mean scores is observed in almost all the cases with increase in experience. Mean rank scores are given in Table 4.12B

Table 4.12A
Kruskal-Wallis test results (knowledge across experience groups)

| Test Statistics[a,b] | |
|---|---|
| | Knowledge Items |
| Kruskal-Wallis H | 4.192 |
| Df | 4 |
| Asymp. Sig. | .381 |

a. Kruskal Wallis Test
b. Grouping Variable: Experience Groups

Table 4.12B
Mean Rank (knowledge across experience groups)

| | Experience Groups | N | Mean Rank |
|---|---|---|---|
| Knowledge Items | Up to 5 | 20 | 97.53 |
| | 6 - 10 | 25 | 99.44 |
| | 11 - 20 | 61 | 112.80 |
| | 21 - 30 | 45 | 110.61 |
| | >30 | 74 | 123.38 |
| | Total | 225 | |

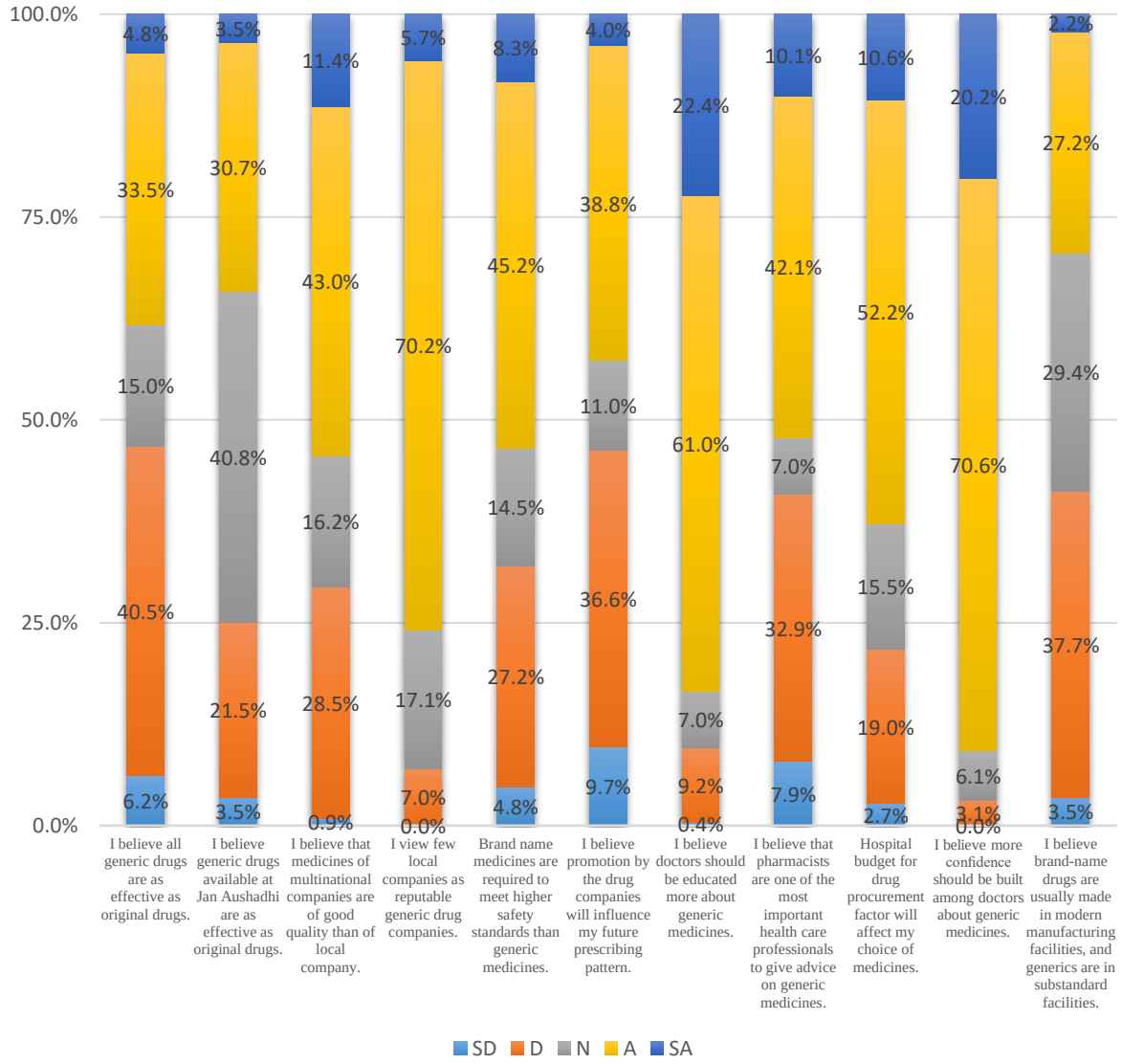
### 4.3.2 Response to attitude items

The frequency of respondent responses to attitude-related questions is shown in Table 4.13

Table 4.13
Attitude related statements along with frequency (numbers & %) of responses

| Statement | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|---|---|---|---|---|
| *I believe all generic drugs are as effective as original drugs.* | 14 | 92 | 34 | 76 | 11 |
| | 6.2% | 40.5% | 15.0% | 33.5% | 4.8% |
| *I believe generic drugs available at Jan Aushadhi are as effective as original drugs.* | 08 | 49 | 93 | 70 | 08 |
| | 3.5% | 21.5% | 40.8% | 30.7% | 3.5% |
| *I believe that medicines of multinational companies are of good quality than of local company.* | 02 | 65 | 37 | 98 | 26 |
| | 0.9% | 28.5% | 16.2% | 43.0% | 11.4% |
| *I view few local companies as reputable generic drug companies.* | 00 | 16 | 39 | 160 | 13 |
| | 0.0% | 7.0% | 17.1% | 70.2% | 5.7% |
| *Brand name medicines are required to meet higher safety standards than generic medicines.* | 11 | 62 | 33 | 103 | 19 |
| | 4.8% | 27.2% | 14.5% | 45.2% | 8.3% |
| *I believe promotion by the drug companies will influence my future prescribing pattern.* | 22 | 83 | 25 | 88 | 09 |
| | 9.7% | 36.6% | 11.0% | 38.8% | 4.0% |
| *I believe doctors should be educated more about generic medicines.* | 01 | 21 | 16 | 139 | 51 |
| | 0.4% | 9.2% | 7.0% | 61.0% | 22.4% |
| *I believe that pharmacists are one of the most important health care professionals to give advice on generic medicines.* | 18 | 75 | 16 | 96 | 23 |
| | 7.9% | 32.9% | 7.0% | 42.1% | 10.1% |
| *Hospital budget for drug procurement factor will affect my choice of medicines.* | 06 | 43 | 35 | 118 | 24 |
| | 2.7% | 19.0% | 15.5% | 52.2% | 10.6% |
| *I believe more confidence should be built among doctors about generic medicines.* | 00 | 07 | 14 | 161 | 46 |
| | 0.0% | 3.1% | 6.1% | 70.6% | 20.2% |
| *I believe brand-name drugs are usually made in modern manufacturing facilities, and generics are in substandard facilities.* | 08 | 86 | 67 | 62 | 05 |
| | 3.5% | 37.7% | 29.4% | 27.2% | 2.2% |

*Source*: Author Compilation




*Source*: Author Compilation

Figure 4.2 Graphic representation of attitude-related responses

It was found that less than 50% of respondents (38.3%) believe that generic medicines work like the innovator drugs, but when it comes to generic performance in Jan Aushadhi's program, 34.2% of doctors believe generic medicines are as effective as original drugs whereas majority of the doctors (40.8%) which being the highest neutral response amongst all the items, have neither a positive nor negative response. 54.4%

of doctors believe that medicines of multinational companies are superior in quality over local companies. Majority of the doctors (75.9%), believe that not all domestic companies have a good reputation. More than 50% of physicians (53.5%) believe that branded drugs are required to meet the highest levels of safety over generic medicine. 42.8% of physicians believe that drug companies engaged in promotion, influence prescription pattern of medical practitioners while 46.3% of physicians have the opposite belief. Overwhelmingly, 83.4% of respondents (second positive response to attitude items) believe that physicians should be educated more on generic drugs. Most doctors (52.2%) are of the view that of healthcare professionals, pharmacists are the most important to give recommendation on generic drugs. 62.8% of doctors say the hospital budget influences their choice of medication. Overwhelmingly, 90.8% of physicians (highest positive response of attitude items) believe that more confidence should be built among physicians about generics. About one-third of physicians (29.4%) believe that brand-name drugs are commonly manufactured in modern manufacturing facilities and generics in below the required standards and other equal number of respondents have a neutral view.

#### 4.3.2.1 Influence of attitude on doctors in prescribing generic medicines

In order to determine the statistical significance between the attitude towards generic medicine and the doctor's prescription, the research question was framed.

***RQ 2: Does attitude towards generic medicines play a significant role in influencing doctors in prescribing generic medicines?***

To evaluate the statistical significance between attitude towards generics & prescription of generic medicines, Spearman's Rank Correlation Coefficient was computed.

Correlation between the two variables was found to be positive, $r = .431$, $N = 224$, $p < .001$ indicating significant moderate association between attitude of generic medicines in doctors and prescription of generic medicines. Thus, the finding supports alternate hypothesis and it can be concluded that attitude towards generic medicines is having a significant influence on doctors' prescribing generic medicines. Spearman test results are summarized in Table 4.14

Table 4.14
Spearman test results (attitude)

| | | | Attitude items | Prescription of generic medicines |
|---|---|---|---|---|
| Spearman's rho | Attitude items | Correlation Coefficient | 1.000 | .431** |
| | | Sig. (2-tailed) | | 0.000 |
| | | N | 224 | 224 |
| | Prescription of generic medicines | Correlation Coefficient | .431** | 1.000 |
| | | Sig. (2-tailed) | 0.000 | |
| | | N | 224 | 228 |

**. Correlation is significant at the 0.01 level (2-tailed).

A good percentage of respondents had an attitude towards generic drugs based on the analysis of their responses. The overall findings were in contrast to a study (Gupta et al., 2018) wherein majority of the doctors had shown a positive attitude. However, similarity was seen in few areas such as manufacturing facility wherein majority of doctors in both the studies did not believe that generics are made in below the required standard facility as compared to brands. Another area of similarity was in education, where the majority of doctors felt that doctors should be more educated about generic medicines.

Compared with knowledge, the attitude was found to be slightly higher in direction and degree of association.

#### 4.3.2.2 Attitude amongst doctors at Healthcare Centers

With an aim to find out the statistical significance between attitude towards generic medicines amongst doctors at healthcare centers (primary, secondary, tertiary) a research question was framed.

*RQ 2.1: Is there any difference in attitude towards generic medicines amongst doctors serving at primary, secondary and tertiary healthcare centers?*

Kruskal-Wallis test was performed to examine the difference in attitude towards generic medicines amongst doctors at different healthcare centers. The responses from doctors were distributed into three groups as per their practice:

Group 1: Primary Healthcare Center

Group 2: Secondary Healthcare Center

Group 3: Tertiary Healthcare Center

The results showed no statistical significant difference amongst doctors at different healthcare centers, $H = 2.161, N = 224, p = .339$ supporting null hypothesis. However, attitude of doctors towards generic drugs is high (mean value) at primary healthcare center than doctors at secondary and tertiary healthcare centers. The test results are given in Table 4.15

Table 4.15
Kruskal-Wallis test results (attitude across healthcare centers)

| Test Statistics[a,b] | |
|---|---|
| | Attitude Items |
| Kruskal-Wallis H | 2.161 |
| df | 2 |
| Asymp. Sig. | .339 |

a. Kruskal Wallis Test
b. Grouping Variable: Healthcare Center

Thus, null hypothesis is accepted and the conclusion may be drawn that there is no difference in attitude towards generic medicines amongst doctors serving at primary, secondary and tertiary healthcare centers.

#### 4.3.2.3 Attitude towards generic medicines in male and female doctors

*RQ 2.2: Is there any difference in attitude towards generic medicines between male and female doctors?*

Kruskal Wallis test showed no statistical significant difference in male and female doctors, $H = .007$, $N = 224$, $p = .933$ Table 4.16 shows test results.

Thus, alternate hypothesis is rejected and the conclusion may be drawn that there is no significant difference in attitude of generic medicines in male and female doctors.

Table 4.16
Kruskal-Wallis test results (attitude across gender)

| Test Statistics[a,b] | |
|---|---|
| | Attitude Items |
| Kruskal-Wallis H | .007 |
| df | 1 |
| Asymp. Sig. | .933 |

a. Kruskal Wallis Test
b. Grouping Variable: Gender

#### 4.3.2.4 Attitude towards generic medicines amongst doctors in different age groups

*RQ 2.3: Is there any difference in attitude towards generic medicines amongst doctors in different age groups?*

Kruskal Wallis test showed no statistical significant difference, *H = 2.267, N = 224, p = .687* Test results are given in Table 4.17

Thus, null hypothesis is accepted and it may be concluded that there is no significant difference in attitude towards generic medicines amongst doctors in different age groups.

Table 4.17
Kruskal-Wallis test results (attitude across age groups)

| Test Statistics[a,b] | |
|---|---|
| | Attitude Items |
| Kruskal-Wallis H | 2.267 |
| Df | 4 |
| Asymp. Sig. | .687 |

a. Kruskal Wallis Test
b. Grouping Variable: Age Group

### 4.3.2.5 Attitude towards generic medicines amongst doctors in different employment status

*RQ 2.4: Is there any difference in attitude towards generic medicines amongst doctors who are self-employed, working with Govt. hospitals and Pvt. hospitals?*

Kruskal Wallis test showed statistical significant difference, *H = 16.462, N = 224, p < .001* Test results are given in Table 4.18A

Thus, alternate hypothesis is accepted and conclusion may be drawn that there is significant difference in attitude towards generic medicines amongst doctors in different employment status. The lowest mean rank score is for self-employed and the highest for the doctors at Govt. Hospitals as can be seen from Table 4.18B.

Table 4.18A
Kruskal-Wallis test results (attitude across categories of employment)

| Test Statistics[a,b] | |
|---|---|
| | Attitude Items |
| Kruskal-Wallis H | 16.462 |
| df | 2 |
| Asymp. Sig. | .000 |

a. Kruskal Wallis Test
b. Grouping Variable: Employment

Table 4.18B
Mean Rank (attitude across categories of employment)

| | **Employment** | **N** | **Mean Rank** |
|---|---|---|---|
| Attitude Items | Self Employed | 103 | 96.26 |
| | Govt. Hospital | 43 | 142.98 |
| | Pvt. Hospital | 78 | 117.15 |
| | Total | 224 | |

### 4.3.2.6 Attitude towards generic medicines amongst doctors having different levels of qualification

*RQ 2.5: Is there any difference in attitude towards generic medicines amongst doctors qualified with undergraduate degrees, post-graduate diploma/degrees & post post-graduate degrees?*

Kruskal Wallis test showed no statistical significant difference, $H = 3.955$, $N = 224$, $p = .138$ Test results are given in Table 4.19

Thus, null hypothesis is accepted and it may be concluded that there is no significant difference in attitude towards generic medicines amongst doctors having different levels of qualification.

Table 4.19
Kruskal-Wallis test results (attitude across categories of qualification)

| Test Statistics[a,b] | |
|---|---|
| | Attitude Items |
| Kruskal-Wallis H | 3.955 |
| df | 2 |
| Asymp. Sig. | .138 |

a. Kruskal Wallis Test
b. Grouping Variable: Qualification Categorization

### 4.3.2.7 Attitude towards generic medicines amongst doctors having non-surgical and surgical practice.

*RQ 2.6: Is there any difference in attitude towards generic medicines between doctors having practice involving non-surgical and surgical treatment?*

Kruskal Wallis test revealed no statistical significant difference, $H = 1.596$, $N = 224$, $p = .206$ Test results are given in Table 4.20

Thus, null hypothesis is retained and it may be concluded that there is no significant difference in attitude towards generic medicines amongst doctors having non-surgical and surgical practice.

Table 4.20
Kruskal-Wallis test results (attitude across non-surgical and surgical practice)

| Test Statistics[a,b] | |
|---|---|
| | Attitude Items |
| Kruskal-Wallis H | 1.596 |
| Df | 1 |
| Asymp. Sig. | .206 |

a. Kruskal Wallis Test
b. Grouping Variable: Specialty Categorization

#### 4.3.2.8 Attitude towards generic medicines amongst doctors in different experience groups

*RQ 2.7: Is there any difference in attitude towards generic medicines amongst doctors in different experience groups?*

Kruskal-Wallis test displayed no statistical significant difference, *H = 3.170, N = 222, p = .530.* Table 4.21A shows test results.

Thus, null hypothesis is retained and conclusion may be drawn that there is no significant difference in attitude towards generic medicines amongst doctors in different experience groups. However, mean rank scores indicate increase in mean rank with increase in experience in most of the experience groups. Mean Ranks are given in Table 4.21B

Table 4.21A
Kruskal-Wallis test results (attitude across experience groups)

| Test Statistics[a,b] | |
|---|---|
| | Attitude Items |
| Kruskal-Wallis H | 3.170 |
| df | 4 |
| Asymp. Sig. | .530 |

a. Kruskal Wallis Test
b. Grouping Variable: Experience Groups

Table 4.21B
Mean Rank (attitude across experience groups)

| | Experience Groups | N | Mean Rank |
|---|---|---|---|
| Attitude Items | Up to 5 | 20 | 102.18 |
| | 6 - 10 | 24 | 114.02 |
| | 11 - 20 | 60 | 101.39 |
| | 21 - 30 | 45 | 115.24 |
| | >30 | 73 | 119.23 |
| | Total | 222 | |

### 4.3.3. **Responses to practice items**

Influence of doctors' practice in prescribing generic medicines is now explored.

The frequency of respondent responses to practice-related questions is shown in Table 4.22

Table 4.22
Practice related statements along with frequency (numbers & %) of responses

| Statement | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|---|---|---|---|---|
| *Generic drugs cost less but are as good as brand-name drugs.* | 6 | 66 | 42 | 100 | 14 |
| | 3% | 29% | 18% | 44% | 6% |
| *Generic drugs of Jan Aushadhi cost less but are as good as brand-name drugs.* | 3 | 50 | 84 | 82 | 9 |
| | 1% | 22% | 37% | 36% | 4% |
| *Incentives should be paid to doctors for prescribing generics.* | 53 | 118 | 25 | 29 | 3 |
| | 23% | 52% | 11% | 13% | 1% |
| *Branded drug prescription should not be substituted by generic drugs.* | 7 | 61 | 37 | 99 | 24 |
| | 3% | 27% | 16% | 43% | 11% |
| *Patient should have the liberty to choose generics over branded drugs.* | 6 | 34 | 14 | 133 | 41 |
| | 3% | 15% | 6% | 58% | 18% |
| *I hesitate to prescribe generics in few therapeutic cases / some diseases.* | 5 | 34 | 32 | 132 | 25 |
| | 2% | 15% | 14% | 58% | 11% |
| *My prescription is influenced by my personal experience with medicines.* | 1 | 7 | 9 | 161 | 50 |
| | 0% | 3% | 4% | 71% | 22% |
| *My prescription is influenced by the patients' demands.* | 18 | 107 | 22 | 70 | 11 |
| | 8% | 47% | 10% | 31% | 5% |
| *I consider the socioeconomic status of the patient while prescribing medicines.* | 5 | 27 | 12 | 124 | 60 |
| | 2% | 12% | 5% | 54% | 26% |
| *I prescribe branded drugs because their names are easy to memorize.* | 38 | 132 | 26 | 30 | 1 |
| | 17% | 58% | 11% | 13% | 0% |
| *Medical representatives influence my prescription.* | 46 | 116 | 18 | 46 | 1 |
| | 20% | 51% | 8% | 20% | 0% |
| *I usually prescribe medicines that are easily available.* | 1 | 7 | 9 | 179 | 32 |
| | 0% | 3% | 4% | 79% | 14% |
| *Switching a patient from a brand name to generics may change the outcome of the therapy.* | 9 | 75 | 51 | 84 | 8 |
| | 4% | 33% | 22% | 37% | 4% |
| *I have not read any time any article on comparison of safety and efficacy of generic vs. brand name medicines.* | 2 | 44 | 20 | 144 | 15 |
| | 1% | 20% | 9% | 64% | 7% |
| *Awareness seminars should be conducted for doctors to initiate prescription of generic drugs.* | 1 | 13 | 15 | 162 | 37 |
| | 0% | 6% | 7% | 71% | 16% |
| *Published literature on generic drugs will develop doctor's confidence for its prescription.* | 1 | 8 | 8 | 159 | 51 |
| | 0% | 4% | 4% | 70% | 22% |
| *Prescription of generic drugs should be made mandatory.* | 27 | 111 | 45 | 33 | 12 |
| | 12% | 49% | 20% | 14% | 5% |

*Source*: Author Compilation

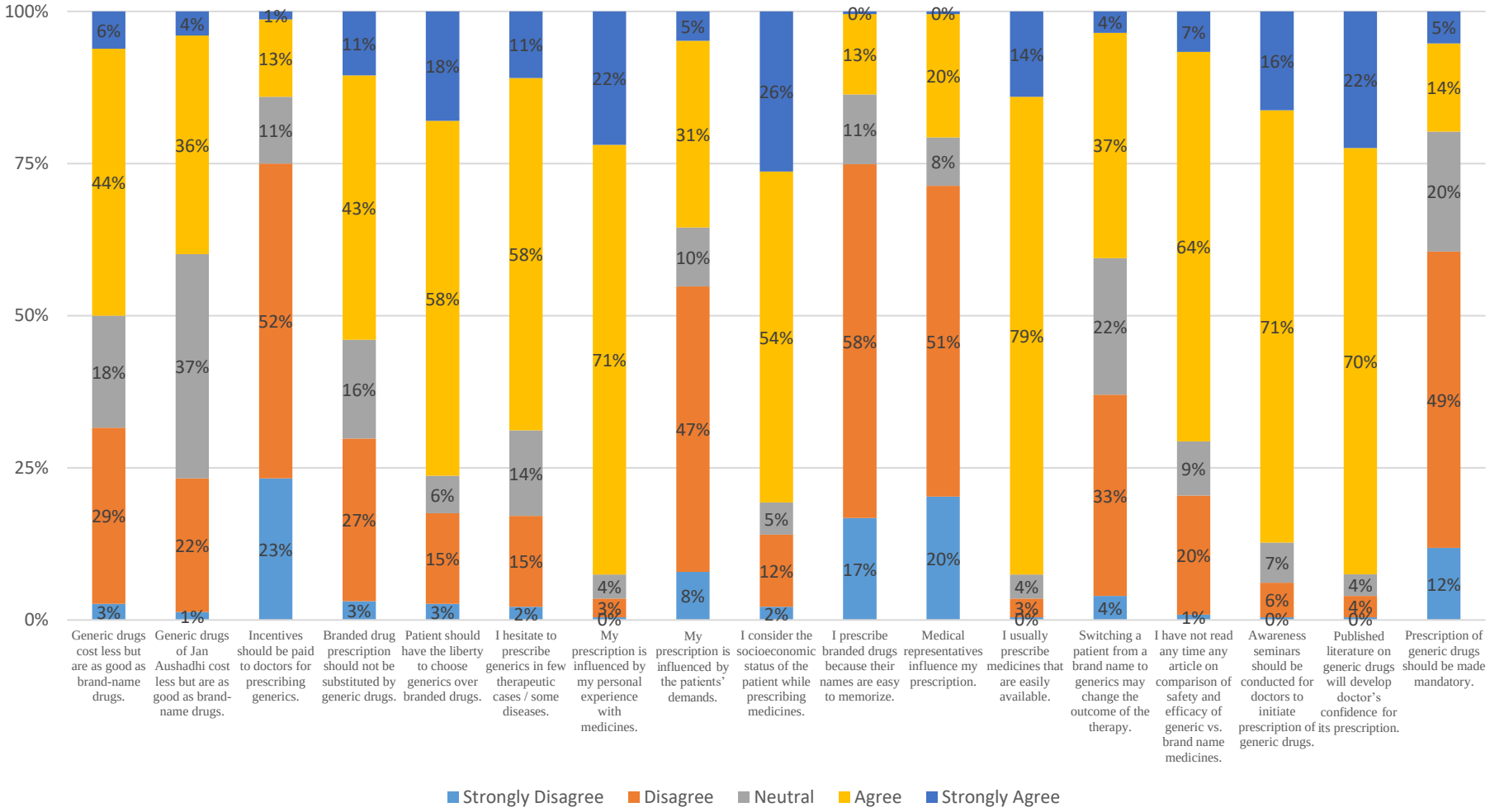



Figure 4.3 Graphic representation of practice-related responses

50% of doctors agree that generic drugs are low-priced and effective as branded medicines, whereas only 40% agree about generics at Jan Aushadhi kendras. The highest neutral response, 37%, is undecided on generics in Jan Aushadhi kendras.

Most doctors (75%) oppose incentives for prescribing generics. 54% agree that generic medicines should not replace their branded prescriptions. 76% of doctors support patients' right to choose generic alternatives over branded drugs. There is hesitation among 69% of doctors about prescribing generics in certain diseases. According to 93% of respondents, their prescriptions are influenced by their personal experiences with medicine. Approximately 55% doctors disagree with being influenced by patient demands. When prescribing medicines, 80% of physicians take into account the socio-economic status of their patients. 75 percent of doctors do not prescribe branded medicines due to easy recall of brand names. In prescribing medicines, 71% do not get influenced by MRs. 93% prescribe medicines that are easily available. A total of 41% (agree) and 37% (disagree) responded as to whether generic medicines changed the outcome of therapy. It is estimated that 71% doctors have not read any article comparing branded and generic medicines in terms of efficacy and safety. Almost 90% of doctors are in favor of seminars to promote generic medicines. The majority of respondents (92%) agreed that the use of published literature would increase their confidence in prescribing generic medicines. The majority of doctors (61%) oppose mandatory prescriptions of generic drugs.

As compared to previous studies, there were major similarities and few contrasts. According to this study and in previous ones most doctors disagree that low-priced generics are as good as branded medications (Billa et al., 2014; Badwaik et al., 2015;

Kamejaliya et al., 2017; Tripathi & Bhattacharya, 2018; Aivalli et al., 2018; Roy and Rana, 2018).

According to this study, 71% doctors disagree with being influenced by MRs in recommending medicines, which is in stark contrast to another study (Narayan et al., 2020) in which 62% doctors accept having been influenced by MRs. Many studies have shown, however, that pharmaceutical companies' promotional marketing strategies influence doctors' prescriptions for brand name drugs (Chua et al., 2010; Bachheti & Saklani, 2013; Aivalli et al., 2018; Shetti & Khanna, 2019).

According to this study, 69% doctors agreed that they hesitated to prescribe generics for some serious diseases, compared to 44.6% in one previously conducted (Kamejaliya et al., 2017). The study concluded that 41% agreed and 37% disagreed that switching to generic medications would improve therapy outcomes. In contrast, another study (Gupta et al., 2018) found that 80.9% believed substituting a brand-name medicine with a generic equivalent would not alter the outcome of treatment.

It was found that 93% doctors are in agreement that their prescriptions are influenced by their personal practice with medicines, and the majority (54%) disagree with chemists not substituting branded prescriptions with generics, which matched with the previously conducted studies (Heikkila et al., 2007; Sanyal & Datta, 2011; Colgan et al., 2015; Kamejaliya et al., 2017).

In this study, while prescribing medicines doctors considered socioeconomic status of patients the same way as in the other study (Chua et al., 2010) & product obtainability (Kamejaliya et al., 2017; Tripathi & Bhattacharya, 2018).

This study found that most doctors disagree with incentives to prescribe generic drugs, whereas another study (Chua et al., 2010; Bachheti & Saklani, 2013) found that doctors are influenced with their choices of medicines by product bonuses and rewards of drug companies.

The study found that the majority of doctors (71%) had not read any articles comparing branded and generic medicines on efficacy and safety, and that inadequate information was a reason for doctors (33.06%) to choose branded drugs.

Over 60% of doctors in this study and one previous (Kamejaliya et al., 2017) disagree with compulsory prescribing of generics.

#### 4.3.3.1 Influence of doctors' practice in prescribing generic medicines

Using the following research question, the statistical significance of doctor's practice on prescription behavior towards generic medicines was examined.

***RQ 3: Does medicine prescribing practice of doctors* play *a significant role in influencing them in prescribing generic medicines?***

For the purpose of assessing the statistical significance of the relationship between doctors' practice and generic medication prescriptions, Spearman's rank correlation was computed. The two variables were found to be positively correlated, $r = .450$, $N = 221$, $p < .001$. Table 4.23 provides test results.

Moderate correlation was found to be significant between doctors' practice and generic prescription based on Spearman's correlation. The practice followed by doctors has a significant impact on their decision to prescribe generic drugs.

Table 4.23
Spearman test results (practice and prescription of generic medicines)

| | | | Practice items | Prescription of generic medicine |
|---|---|---|---|---|
| Spearman's rho | Practice items | Correlation Coefficient | 1.000 | .450** |
| | | Sig. (2-tailed) | . | .000 |
| | | N | 221 | 221 |
| | Prescription of generic medicines | Correlation Coefficient | .450** | 1.000 |
| | | Sig. (2-tailed) | .000 | . |
| | | N | 221 | 221 |

**. Correlation is significant at the 0.01 level (2-tailed).

### 4.3.3.2 Practice amongst doctors at Healthcare Centers

With an aim to find out the statistical significance between practice amongst doctors at healthcare centers (primary, secondary, tertiary) a research question was framed.

*RQ 3.1: Is there any difference in practice amongst doctors serving at primary, secondary and tertiary hospitals?*

Kruskal Wallis test was performed to examine the difference in practice of generic medicines amongst doctors at different healthcare centers. The responses from doctors were distributed into three groups as per their practice:

Group 1: Primary Healthcare Center

Group 2: Secondary Healthcare Center

Group 3: Tertiary Healthcare Center

The results showed no statistical significant difference amongst doctors at different healthcare centers, $H = .510$, $N = 221$, $p = .775$ The test results are given in Table 4.24

Thus, null hypothesis is accepted and conclusion may be drawn that there is no difference in practice amongst doctors serving at primary, secondary and tertiary healthcare centers.

Table 4.24

Kruskal-Wallis test results (practice across healthcare centers)

| Test Statistics[a,b] | |
|---|---|
| | Practice Items |
| Kruskal-Wallis H | .510 |
| df | 2 |
| Asymp. Sig. | .775 |

a. Kruskal Wallis Test
b. Grouping Variable: Healthcare Center

#### 4.3.3.3 Practice in male and female doctors

*RQ 3.2: Is there any difference in practice between male and female doctors?*

Kruskal Wallis test showed no statistical significant difference in male and female doctors, $H = .016$, $N = 221$, $p = .901$. Test results are given in Table 4.25. Thus, null hypothesis is accepted and conclusion may be drawn that there is no significant difference in practice of generic medicines in male and female doctors.

Table 4.25
Kruskal-Wallis test results (practice across gender)

| Test Statistics[a,b] | |
|---|---|
| | Practice Items |
| Kruskal-Wallis H | .016 |
| df | 1 |
| Asymp. Sig. | .901 |

a. Kruskal Wallis Test
b. Grouping Variable: Gender

#### 4.3.3.4 Practice amongst doctors in different age groups

*RQ 3.3: Is there any difference in practice amongst doctors in different age groups?*

Kruskal Wallis test showed no statistical significant difference, *H = 4.139, N = 221, p=.388.* Test results are given in Table 4.26

Therefore, the null hypothesis is accepted; there is no significant differences in practice among doctors in different age groups.

Table 4.26
Kruskal-Wallis test results (practice across age groups)

| Test Statistics[a,b] | |
|---|---|
| | Practice Items |
| Kruskal-Wallis H | 4.139 |
| df | 4 |
| Asymp. Sig. | .388 |

a. Kruskal Wallis Test
b. Grouping Variable: Age Group

### 4.3.3.5 Practice amongst doctors in different employment status

*RQ 3.4: Is there any difference in practice amongst doctors who are self-employed, working with Govt. hospitals and Pvt. hospitals?*

Kruskal Wallis test showed statistical significant difference, *H = 5.699, N = 221, p = .058.* Test results are given in Table 4.27A

Thus, alternate hypothesis is rejected establishing no significant difference in practice amongst doctors in different employment status, however indicative significance prevails. The highest mean rank score is for doctors working in Govt. hospital as can be seen from Table 4.27B.

Table 4.27A
Kruskal-Wallis test results (practice across categories of employment)

| Test Statistics[a,b] | |
|---|---|
| | Practice Items |
| Kruskal-Wallis H | 5.699 |
| df | 2 |
| Asymp. Sig. | .058 |

a. Kruskal Wallis Test
b. Grouping Variable: Employment

Table 4.27B
Mean Rank (practice across categories of employment)

| | **Employment** | **N** | **Mean Rank** |
|---|---|---|---|
| Practice items | Self-employed | 101 | 105.38 |
| | Govt. Hospital | 43 | 131.83 |
| | Pvt. Hospital | 77 | 106.74 |
| | Total | 221 | |

### 4.3.3.6 Practice amongst doctors having different levels of qualification

*RQ 3.5: Is there any difference in practice amongst doctors qualified with undergraduate degrees, post-graduate diploma/degrees & post post-graduate degrees?*

Kruskal Wallis test showed no statistical significant difference, $H = 2.169$, $N = 221$, $p = .338$. Test results are given in Table 4.28

Thus, null hypothesis is accepted drawing conclusion that there is no significant difference in practice amongst doctors having different levels of qualification.

Table 4.28
Kruskal-Wallis test results (practice across categories of qualification)

| Test Statistics[a,b] | |
|---|---|
| | Practice Items |
| Kruskal-Wallis H | 2.169 |
| df | 2 |
| Asymp. Sig. | .338 |

a. Kruskal Wallis Test
b. Grouping Variable: Qualification Categorization

#### 4.3.3.7 Practice amongst doctors having non-surgical and surgical practice.

*RQ 3.6: Is there any difference in practice amongst doctors giving non-surgical and surgical treatment?*

Kruskal Wallis test showed no statistical significant difference, *H = 1.041, N = 221, p = .308.* Test results are given in Table 4.29

Thus, null hypothesis is retained establishing no significant difference in practice amongst doctors having non-surgical and surgical practice.

Table 4.29
Kruskal-Wallis test results (practice across non-surgical and surgical practice)

| Test Statistics[a,b] | |
|---|---|
| | Practice Items |
| Kruskal-Wallis H | 1.041 |
| df | 1 |
| Asymp. Sig. | .308 |

a. Kruskal Wallis Test
b. Grouping Variable: Specialty Categorization

#### 4.3.3.8 Practice towards generic medicines amongst doctors in different experience groups

*RQ 3.7: Is there any difference in practice of prescribing medicines amongst doctors in different experience groups?*

Kruskal-Wallis test showed no statistical significant difference, *H = 1.920, N = 221, p = .750.* Table 4.30 shows test results.

Thus, null hypothesis is retained and conclusion may be drawn that there is no significant difference in medicine prescribing practice amongst doctors in different experience groups.

Table 4.30
Kruskal-Wallis test results (practice across experience groups)

| Test Statistics[a,b] | |
|---|---|
| | Practice Items |
| Kruskal-Wallis H | 1.920 |
| df | 4 |
| Asymp. Sig. | .750 |

a. Kruskal Wallis Test
b. Grouping Variable: Experience Groups

Analyzing the responses, it was found that a good percentage of respondents prefer branded medicines in practice. In the Kruskal-Wallis tests, it was not found that the practice of doctors differed between men and women, between different age groups, between doctors in different healthcare centers (primary, secondary, tertiary), among doctors who were engaged differently (self-employed, government hospital, private hospital), who held undergraduate degrees, post-graduate diploma/degrees & post post-graduate degrees and who had non-surgical & surgical practices.

#### 4.3.4.1 Practice of prescribing generic medicines amongst doctors at Healthcare Centers (primary, secondary, tertiary)

To find out the statistical significance in practice of prescribing generic medicines amongst doctors at primary, secondary and tertiary care centers a research question was framed.

***RQ 4: Is there any difference in practice of prescribing generic medicines amongst doctors serving at primary, secondary and healthcare centers?***

Kruskal-Wallis test was performed to examine the difference in practice of prescribing generic medicines amongst doctors at different healthcare centers. The responses from doctors were distributed into three groups as per their practice at:

Group 1: Primary Healthcare Center

Group 2: Secondary Healthcare Center

Group 3: Tertiary Healthcare Center

The results showed statistical significant difference amongst doctors at different healthcare centers, *H = 9.546, N = 228, p = .008.* The test results are given in the Table 4.31A

Thus, null hypothesis is rejected and it may be concluded that there is statistically significant difference in practice of prescribing generic medicines amongst doctors serving at primary, secondary and tertiary healthcare centers. The variation in mean rank score is the lowest for doctors serving secondary care hospitals followed by primary and tertiary care as per the information given in the Table 4.28B reflecting that doctors at tertiary care health centers tend to follow a practice of prescribing generic medicines which is higher than primary care and primary care is higher than secondary care.

Table 4.31A
Kruskal-Wallis test results (generic prescribing across healthcare centers)

| Test Statistics[a,b] | |
|---|---|
| | Generic Prescribing |
| Kruskal-Wallis H | 9.546 |
| df | 2 |
| Asymp. Sig. | .008 |

a. Kruskal Wallis Test
b. Grouping Variable: Healthcare Center

Table 4.31B
Mean Rank (generic prescribing at primary, secondary, tertiary healthcare centers)

| | Healthcare Center Type | N | Mean Rank |
|---|---|---|---|
| Practice of prescribing generic medicines | Primary Care | 56 | 107.27 |
| | Secondary Care | 85 | 102.59 |
| | Tertiary Care | 87 | 130.79 |
| | Total | 228 | |

## 4.4. Influence of KAP (Knowledge, Attitude, Practice) of doctors in prescribing generic medicines

With an aim to test the validity of findings of the study using the Tricomponent model Cognitive-Affective-Conative, a research question was framed.

***RQ 5: Does knowledge (cognitive) of generic medicine, attitude (affective) towards generic medicines and practice (conative) have a significant influence on doctors prescribing generic medicines?***

In order to get the result, the analysis is done by employing the tri-component model. The responses against the three components cognitive, affective and conative are analyzed and discussed as follows.

### 4.4.1 Cognitive

The frequency of responses towards cognitive generic drug is given in figure 4.4

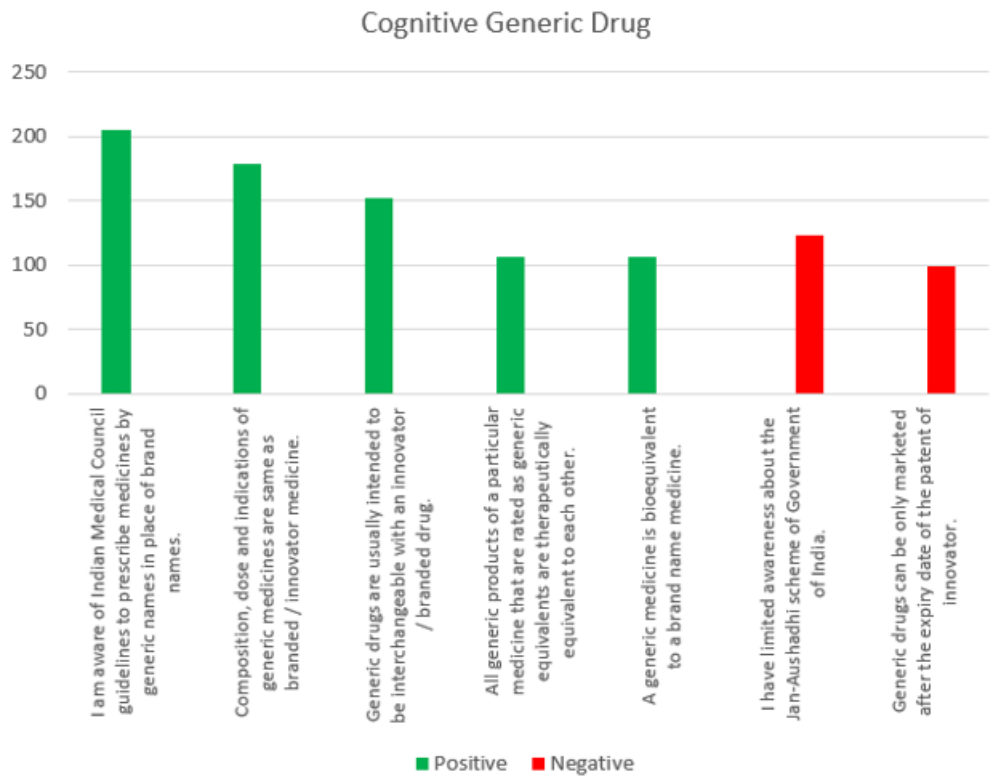



Figure 4.4 Frequency of responses towards knowledge (cognitive) of generic drug

The analysis reflect evidence that knowledge of generic medicines may influence doctors' cognitive of generic drug in prescribing generic medicines. IMC guidelines, generics same as branded medicine in composition, dose & indications and interchangeability with brands may have strong positive influence. However, therapeutically equivalence & bioequivalence of generics compared with brands have weak positive influence, whereas, limited awareness to generics at Jan Aushadhi and introduction of generics post patent expiry may have negative influence.

### 4.4.2 Affective

The frequency of responses towards affective generic drug is given in figure 4.5

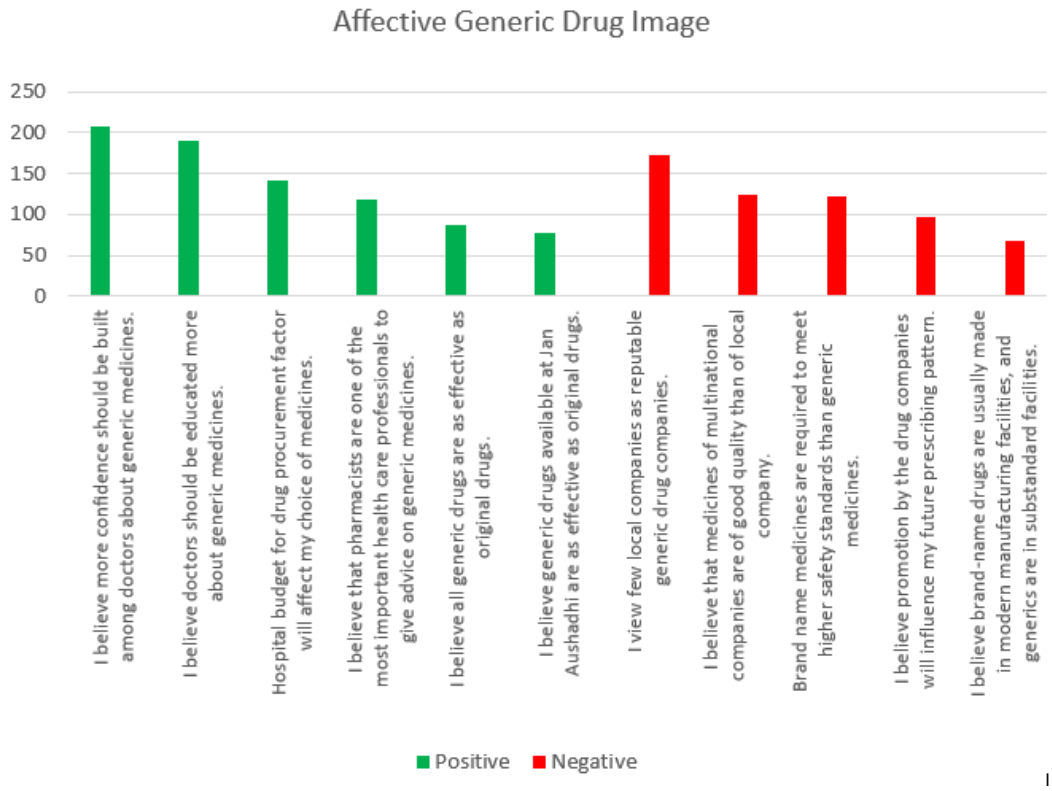



Figure 4.5 Frequency of responses towards attitude (affective) towards generic drug

The analysis reflect evidence that attitude towards generic medicines may influence doctors' affective generic drug image in prescribing generic medicines. Confidence building & education have been found to be strong positives whereas effectiveness of generic drugs (including generics at Jan Aushadhi) is a weak positive. Reputation of companies, GMP of manufacturing facilities, quality of MNCs products, promotional activities by drug companies act as negatives in affective generic drug image.

### 4.4.3 Conative

The frequency of responses towards practice (conative) is given in figure 4.6

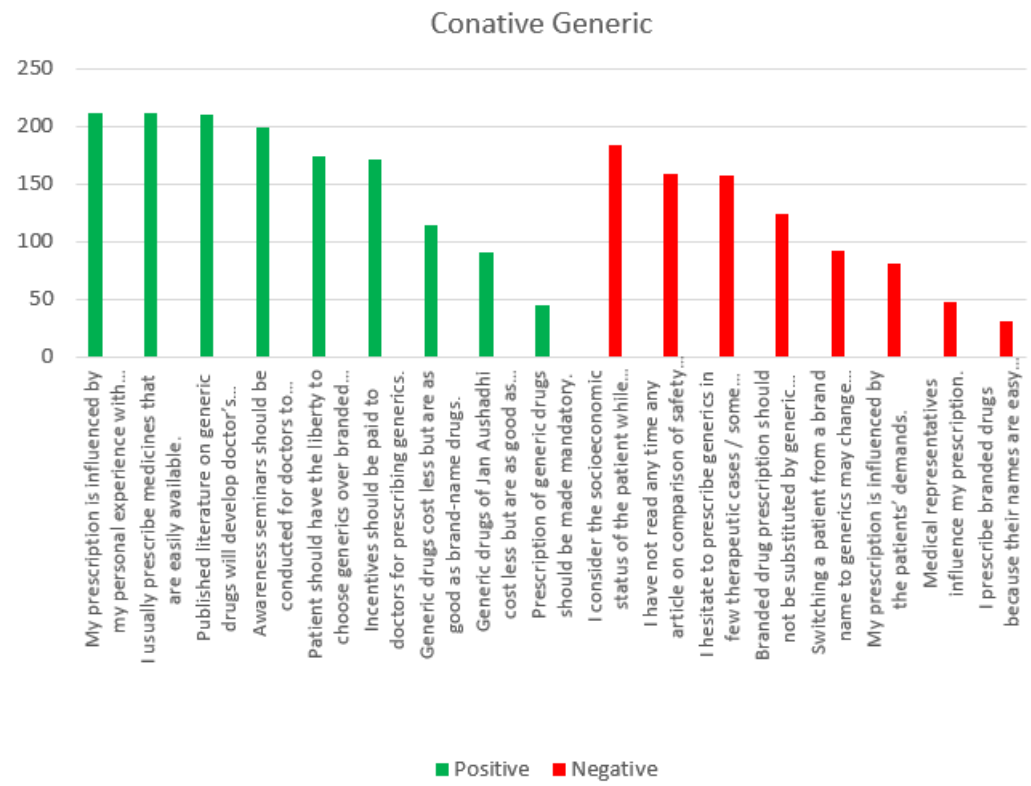



Figure 4.6 Frequency of responses towards practice related questions

The analysis reflect evidence that practice of doctors may influence doctors' conative generic drug image in prescribing generic medicines. Personal experience of doctors with medicines, availability of medicines and published literature /seminars are major positives. Consideration of socio-economic status of patients, non-availability of comparative information on safety & efficacy between branded and generic medicines and hesitation in prescribing generics in all diseases, substitution of branded prescription with generic are major negatives in conative generic drug image acting as hindrances in doctors prescribing generic drugs.

To assess relationship between KAP (knowledge, attitude, practice) and generic prescribing, Spearman's Rank Correlation was computed.

Correlation was found to be positive between the two variables, *r = .499, N = 217*, p<.001. Table 4.32 shows test results.

Results of the Spearman correlation indicate a significant moderate association between KAP and prescribing of generic medicines.

Thus, the finding supports alternate hypothesis and it may be concluded that knowledge of generic drugs, attitude towards generics and prescription practice being followed by medical practitioners significantly influences them in prescribing generic drugs.

Table 4.32
Spearman test results (Knowledge, Attitude & Practice and generic prescribing)

| | | | Knowledge, Attitude, Practice items | Prescribing of generic medicines |
|---|---|---|---|---|
| Spearman's rho | Knowledge, Attitude, Practice items | Correlation Coefficient | 1.000 | .499** |
| | | Sig. (2-tailed) | . | .000 |
| | | N | 217 | 217 |
| | Prescribing of generic medicines | Correlation Coefficient | .499** | 1.000 |
| | | Sig. (2-tailed) | .000 | . |
| | | N | 217 | 228 |

**. Correlation is significant at the 0.01 level (2-tailed).

Result shows that the generic medicines are evaluated by doctors which has bearing on its prescribing. The evaluation is based on cognitive, affective and conative which together condition the mind of medical practitioners towards prescribing generic drugs which explains the low acceptance of generic medicines. The concerted & focused efforts are required in areas as highlighted to reinforce positives and to weaken the negatives under each of cognitive, affective and conative to realize full potential of generics contributing significantly to social cause.