

# **Knowledge and Practice of Hand Hygiene and Hand Washing among Medical Students and other Health Care Professionals in Hospital Setting**

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## **Introduction**

### **Introduction and background**

Hand washing dates back to biblical times and the early days of medicine. This simple task is the most important way to prevent infection resulting from pathogenic microorganisms found in all healthcare environments. Not only does hand washing prevent the spread of potentially deadly nosocomial infection, it also saves money. Hospital acquired infections may result in millions of dollars in costs to the healthcare (Cooper, Wisenor, & Roberts, 2005). Hand washing is recognized as the leading measure to prevent cross-transmission of microorganisms and to reduce the incidence of health care associated infections. Despite the relative simplicity of this procedure, compliance with hand washing among health care providers is as low as 40% (Nair, Hanumantappa, Hiremath, Siraj, & Raghunath, 2014).

Health care-associated infections are a serious problem in health care services as they may cause prolonged hospital stays, high mortality, long-term disability, and excess health care costs. Most health care-associated infections can be transmitted from patient to patient via the hands of health care workers. In other words, health care workers' hands due to poor hand washing are the most usual type of vehicle for the transmission of health care-associated infections (Nabavi, Alavi-Moghaddam, Gachkar, & Moeinian, 2015).

Infection caused due to hospital acquired microbes is an evolving problem worldwide, and horizontal transmission of bacterial organisms continues to cause a high nosocomial infection rate in health care settings. Nosocomial infections due to poor hand washing are a major cause of increasing morbidity, mortality and health care costs among hospitalized patients worldwide (Maheshwari, 2014). The high prevalence of these infections, as high as 19%, in developing countries poses a challenge to health care providers. Hand washing is considered the single most cost-effective public health measure for preventing health care associated infection (HCAI) (Maheshwari, 2014).

Over 95% of neonatal deaths occur in developing countries with about half of them occurring at home. In Africa, diarrheal disease is the single largest cause of death among children under-five and a major cause of childhood illness. Some of the risk factors for death from diarrhea in children in sub-Saharan Africa are poor nutrition, early introduction of complementary foods and poor hygiene at the household level (Nabavi et al., 2015). Little is known about the relative contributions of different diarrhea-causing pathogens to diarrheal deaths. Unfortunately, there is a paucity of information on the impact of hand washing practices by birth attendants or caretakers on neonatal mortality (Aigbiremolen et al., 2015). Hand washing is the simplest, most effective measure for preventing nosocomial infections. Despite advances in infection control and hospital epidemiology, Semmelweis' message is not consistently translated into clinical practice, and health-care workers' adherence to recommended hand washing practices is unacceptably low (Pittet, 2001). Numerous studies document the pivotal role of healthcare workers' (HCWs) hands in the propagation of microorganisms within the healthcare environment and ultimately to patients (Allegranzi & Pittet, 2009).

To address this problem, continuous efforts are being made to identify effective and sustainable strategies. One of such efforts is the introduction of an evidence-based concept of

“My five moments for hand washing” by World Health Organization. These five moments that call for the use of hand washing include the moment before touching a patient, before performing aseptic and clean procedures, after being at risk of exposure to body fluids, after touching a patient, and after touching patient surroundings. This concept has been aptly used to improve understanding, training, monitoring, and reporting hand washing among healthcare workers (Nair et al., 2014).

Hence the WHO’s concept was made the basis of the present study to evaluate hand washing awareness and compliance among undergraduate medical students of the numerous medical and nursing colleges around the globe. This study is the first of its kind in this institute and is expected to inspire further projects in other medical institutions and in the long run promote the concept of proper hand washing among trainee medical students (Al Kadi & Salati, 2012).

### **Objectives of the study**

The objectives of my study was:

- To estimate the knowledge about hand hygiene and hand washing among medical students and other health care professionals in a hospital setting
- To estimate the practice of hand hygiene and hand washing among medical students and other health care professionals in a hospital setting

### **Literature review**

Healthcare-associated infections pose a continuing threat for mortality and morbidity among hospitalized patients. Hospital-acquired infections mainly draw attention because of the growing awareness that most of them are preventable. Evidence suggests that proper hand washing practice is regarded as the single most effective and simple inexpensive strategy for reducing the prevalence of hospital-acquired infections. However, adherence to good hand washing practice remains consistently poor in the clinical setting. The hygiene adherence by healthcare professionals has been described previously, whereas compliance of medical students has rarely been examined (Herbert, Schlumm, Kessler, & Frings, 2013).

Studies indicate that healthcare workers’ adherence to hand washing guidelines is poor (~40%) and that physician status is a risk factor for non-adherence. Disciplinary differences in hand washing education and assessment during undergraduate training may impact on graduate’s behavior upon entering the workforce (Van De Mortel et al, 2012). Healthcare worker compliance with hand hygiene remains a pervasive problem in medicine. Physicians have notoriously poor compliance. The lack of hand hygiene compliance results in transmission of community-acquired and hospital acquired microorganisms between both patients and providers, which can lead to nosocomial infections. Unfortunately, compliance remains stubbornly low despite efforts to change. While poor hand hygiene is prevalent in the hospital, these behaviors may also be similar among pre-hospital providers. However, hygienic behavior has been infrequently studied in the pre-hospital healthcare worker population despite the fact that it is a key part of the healthcare system (Bucher et al., 2015).

Assessment and raising awareness of hygiene standards during undergraduate education may affect the behavior of graduate students upon entering professional life and contribute to the reduction of nosocomial infection rates. Hence, the present study was performed to examine the knowledge on and the adherence to hygiene guidelines among medical students after completion of the first year of medical studies, with special emphasis on gender differences (Herbert et al., 2013).

One of the key components for limiting spread of healthcare-associated infectious disease is adequate infection control practice. A cornerstone of infection control is ensuring that health-care workers wash their hands at appropriate times. The Association for Professionals in Infection Control and Epidemiology (APIC), the Guidelines for Handwashing and Hospital Environmental Control (1985, 2001) from the Centers for Disease Control and Prevention

(CDC), and the Hospital Infection Control Practices Advisory Committee each highlight specific indications for handwashing compliance (Lankford et al., 2003).

The World Health Organization (WHO) has issued guidelines for procedural hand washing in order to reduce the prevalence of hospital associated infections but lack of knowledge amongst health care workers is associated with poor compliance. An alarming revelation was that compliance was found to be worst before high risk procedures. Despite evidence and expert opinion that hand hygiene reduces transmission of potential pathogens or antimicrobial-resistant organisms, sustained improvements in adherence to hand hygiene recommendations and proper hand washing technique among health care workers are uncommon, even after educational efforts (Maheshwari, 2014).

Although CDC guidelines state that handwashing is the single most important procedure to prevent nosocomial infection, studies continue to report unacceptable health-care worker hand-hygiene compliance rates. Efforts to improve hand-hygiene behavior that have focused on broad-based educational and motivational programs have had minimal sustained success (Lankford et al., 2003).

A heightened understanding of transmission of blood-borne diseases in the mid-1980s to healthcare workers (HCWs), including surgeons, physicians, and residents in training, and the importance of adherence to standard precautions (SP) is well accepted. Adherence to standard precaution is even more important with the emergence of infectious diseases, such as avian influenza, severe acute respiratory syndrome, and the threat of bioterrorism (Askarian et al., 2007).

Medical students are key players in any healthcare teams and are greatly involved in the delivery of patient care. Moreover, during their clinical training, they rotate in infection-sensitive floors, such as: labor and delivery, intensive care units, neonatal intensive care units, and operating rooms, where greater requirements of sterility and infection control are highly demanded. Despite the significant impact of HAIs on the safety and cost of healthcare systems, priority consideration of HAIs education in pre-clerkship and clerkship medical curricula has yet to be reinforced. As a result, largely due to lack of knowledge and skills, clerkship students entering clinical training are at a greater risk of causing HAIs to the patients (Hamadah et al., 2015).

It has been known for many years that HCWs encounter difficulties in complying with hand hygiene indications at different levels. Insufficient or very low compliance rates have been reported from both developed and developing countries. Reasons which explain suboptimal practices are multiple and may vary according to the setting and the resources available. For example, the lack of appropriate infrastructure and equipment to enable hand hygiene performance, the cultural background, and even religious beliefs can play an important role in hindering good practices (Askarian et al., 2007). The most frequently observed factors determining poor hand hygiene compliance are: (i) belonging to a certain professional category (i.e. doctor, nursing assistant, physiotherapist, and technician); (ii) working in specific care areas (i.e. intensive care, surgery, anesthesiology, emergency medicine); (iii) understaffing and overcrowding; and (iv) wearing gowns and/or gloves. Unfortunately, hand hygiene indications at higher risk of being neglected are the ones that prevent pathogen transmission to the patient (i.e. before patient contact and clean/aseptic procedures) (Nabavi et al., 2015).

Therefore, hand hygiene behavior appears not to be homogeneous and can be classified into at least two types of practice. Inherent hand hygiene practice, which drives most community and HCW hand hygiene actions, occurs when hands are visibly soiled, sticky or gritty. On the other hand, elective hand hygiene practice represents those opportunities for hand cleansing not encompassed in the inherent category. Among HCWs, this component of hand hygiene behavior is similar to many common social interactions, such as shaking hands (Al Kadi & Salati, 2012). During healthcare, it would include touching a patient (e.g. taking a pulse or blood pressure) or having contact with an inanimate object in the patient's surroundings. As they recall a common social behavior, these contacts do not necessarily

trigger an intrinsic need to cleanse hands, although they do involve the risk of cross-transmission. According to behavioral theories, this is the component of hand hygiene most likely to be omitted by busy HCWs and it has been repeatedly confirmed by field observations (Aigbiremolen et al., 2015).

Factors perceived as contributing to poor hand-hygiene compliance include unavailability of handwashing sinks, time required to perform hand hygiene, patient's condition, effect of hand-hygiene products on the skin, and inadequate knowledge of the guidelines. In addition, some reports suggest that role models, group behavior, and the level of managerial support influence reported levels of compliance. One measure recommended to improve the hand-hygiene rate is enhanced access to hand-hygiene facilities (Lankford et al., 2003).

The WHO Guidelines on Hand Hygiene in Health Care have been conceived to catalyze hand hygiene improvement in any setting regardless of the resources available and the cultural background. Since there is a strong emphasis in the Guidelines and in their implementation tools on the availability of alcohol-based hand rubs as a key factor for hand hygiene improvement, the issue of the procurement and cost of these products, especially in developing countries, challenges the recommendation feasibility. Indeed, global sales of commercially produced, alcohol based hand rubs in 2007 were as high as US \$3 billion, corresponding to 295 million L in volume, with an overall 16.3% increase compared with 2003 (WHO, unpublished data), mostly observed in Europe and North America (27% and 23% increase, respectively). Looking at procurement opportunities, these products are available only in South Africa in the African continent and in China, India, and Japan in the Asia Pacific region (WHO unpublished data). The most important issue curbing the purchasing power in these regions is the high cost of these products. Market prices vary from US \$2.50 to 8.40 per 100 mL dispenser and are clearly unaffordable for many developing countries. The WHO multimodal hand hygiene improvement strategy offers a possible solution to this obstacle: the local production of either of two WHO-recommended hand rub formulations. The implementation toolkit accompanying the WHO Guidelines on Hand Hygiene in Health Care includes a Guide to Local Production to manufacture alcohol-based hand rubs in hospital pharmacies or other facilities for local use. Two formulations are proposed: one based on ethanol 80% v/v, and one based on isopropyl alcohol 75% v/v; both include hydrogen peroxide 0.125% v/v and glycerol 1.45% v/v. Local production has been carried out in many healthcare settings worldwide and was carefully monitored and evaluated by WHO in several sites (WHO unpublished data). No major procurement, production, and storage obstacles were encountered and long-term stability at tropical temperatures was shown (up to 19 months). The final products complied with quality control standards and had good skin tolerability at very low cost (less than US \$0.50 per 100 mL).

HAIs (health-care associated infections) are associated with lengthy hospitalization, long-term disability, higher microbial drug resistance, increased morbidity, greater mortality, and extra healthcare-related costs. Compliance of all healthcare workers (nurses, physicians, residents, and students) to the universally agreed standard infection control precautions is identified as an effective measure to control and prevent the occurrence of HAIs. These measures not merely protect patients, but the healthcare workers, too (Hamadah et al., 2015). Medical students like other health workers are being part of the health care delivery system are exposed to the same size of risk as other health care workers when they come in contact with patients and contaminated instruments. They are the first level of contact between patients and medical care. They are expected to undertake activities related to patient care with the beginning of their clinical years. They are involved in blood transfusion, injections and surgical operations in their practices. They should have awareness about the risk factors and appropriate precautionary measures especially hand washing to avoid these infections in handling these patients (Nabavi et al., 2015).

The complexity of hand hygiene behavior and the influence of numerous external factors, promotion of good practices is complex and its potential for success depends on the delicate balance between evaluation of benefits and existent barriers. Demonstration of the

effectiveness of recommendations and strategies to improve hand hygiene on the ultimate outcome, i.e. the HCAI rate, is crucial in both motivating HCWs' behavioral change and securing an investment in this preventive measure by policy-makers and healthcare managers. However, research in this field represents a very challenging activity since methodological and ethical concerns make it difficult to conduct randomized controlled trials with appropriate sample sizes that could establish the relative importance of hand hygiene in the prevention of HCAI.

Little is known about the clerkship students' knowledge of hand hygiene as one of the infection control measures. Exploring medical students' knowledge of, and attitudes towards, hand hygiene are of high importance to public health policy makers and medical educators. Such exploration is expected to identify the curricular needs and, therefore, can be appropriately incorporated into the pre-clerkship and clerkship medical curricula to equip students with satisfactory knowledge and skills. In the short- and long-term, such curricular incorporation is expected to decrease the rate of nosocomial HAIs that could be caused by clerkship medical students (Hamadah et al., 2015).

## Material and methods

### Study setting

This study was conducted among the medical College students and other health care professionals in the tertiary care hospital setting.

### Study design

A descriptive cross-sectional epidemiological study design was adopted to carry out this research study.

### Study duration

The study was compiled in nearly three months from 1<sup>st</sup> of January 2016 to 31<sup>st</sup> of March 2016.

### Sample size estimation

All of the conveniently available and willing medical students and other health care professionals in a tertiary care hospital were enrolled as participant in the study.

### Sample technique

Non-probability purposive / Convenient Sampling

**Confidence level: 95%**

### Sampling size

Sample Size for Frequency in a Population	
Population size(for finite population correction factor or fpc)(N):	300
Hypothesized % frequency of outcome factor in the population (p):	50% +/-5
Confidence limits as % of 100(absolute +/- %)(d):	5%
Design effect (for cluster surveys-DEFF):	1
Sample Size(n) for Various Confidence Levels	
Confidence Level (%)	Sample Size
95%	152
80%	100
90%	131
97%	164
99%	182

99.9%	204
99.99%	215

Equation

$$\text{Sample size } n = \frac{[DEFF * Np(1-p)]}{[(d^2 / Z^2_{1-\alpha/2}) * (N-1) + p*(1-p)]}$$

**Study factors**

Basic demographics, socio-economic status, hand washing practice, antiseptic solution utilization for hand hygiene will be the focusing points in this study.

**Data analysis**

All of the data was compiled, entered manually on the Micro Soft Excel 2013 and entered in the statistical packages of social sciences (SPSS 20.0) for the further data analysis and interpretation. Frequency tables were generated. Frequency and ratio was calculated by using SPSS.

The estimation of hand washing and hygiene practice were calculated by descriptive statistics using SPSS. Cross tabulation for comparison of different variables were done and chi-square value was calculated to find out the association of various study factors. The association was calculated upon the p-value which was taken as 0.05.

**Hypothesis**

“A better understanding of knowledge and practice concerning hand washing and hand hygiene and of obstacles and encouragements with compliance to practice recommendations will assist in the development of effective and efficient hand hygiene programs for healthcare professionals”.

**Ethical approval**

The research study was conducted after the authorization of Ethical committee and institutional review board. Each study participant were given a consent form to be a part of this study. Confidentiality and other ethical principles were maintained during the analysis.

**Results**

The study was undertaken in the well-known tertiary care hospital with the medical students and other health care providers in the hospital regarding the hand washing knowledge and practices. There were 152 students and other health care providers in the hospital who participated in this study on the basis of convince sampling. The frequencies and other result are given below.

**Part 1: Demographic profile of the study participants**

**Gender differences in the study participants**

There were 152 health care providers and medical students of a tertiary care hospital who participated in the study. There were 59 % of the male study participants (n = 91) participated in the study. The amount of the female study participants was 41% (n = 61) from all study participants.

Table 1. Gender Differences in the Study Participants

Gender	Frequency	Percent
Male	91	59
Female	61	41
Total	152	100.0

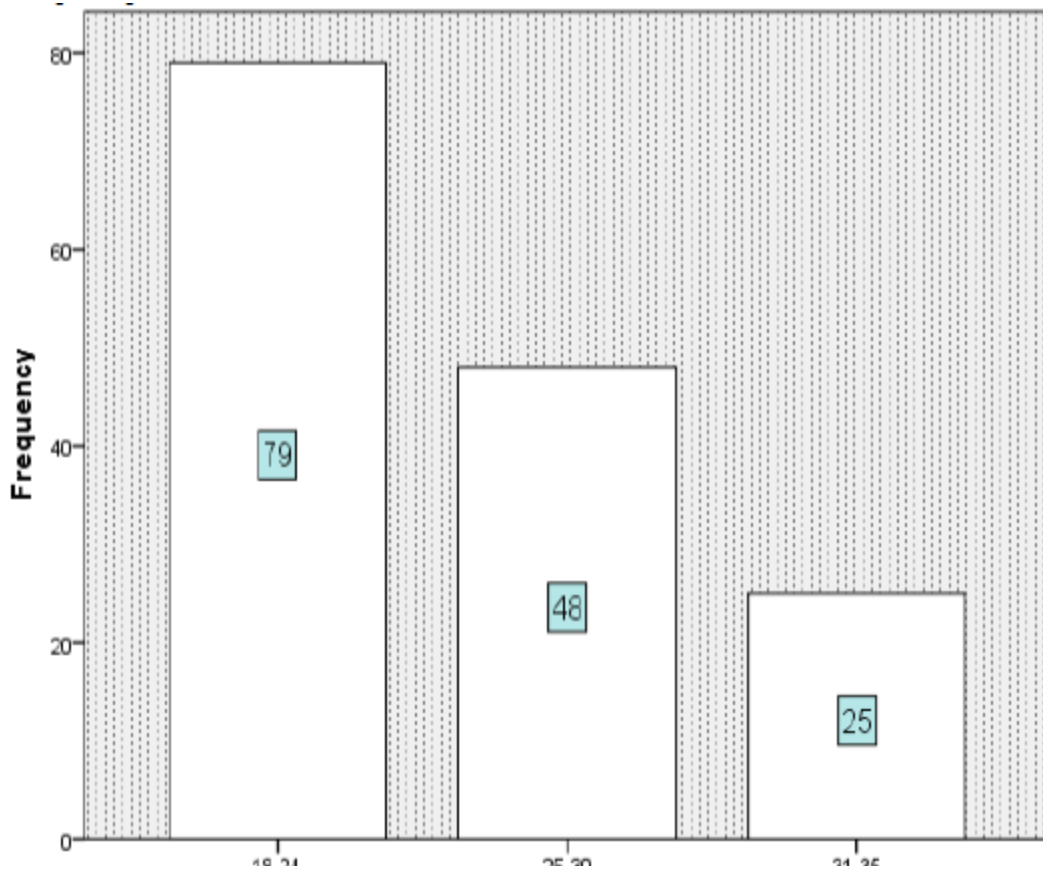
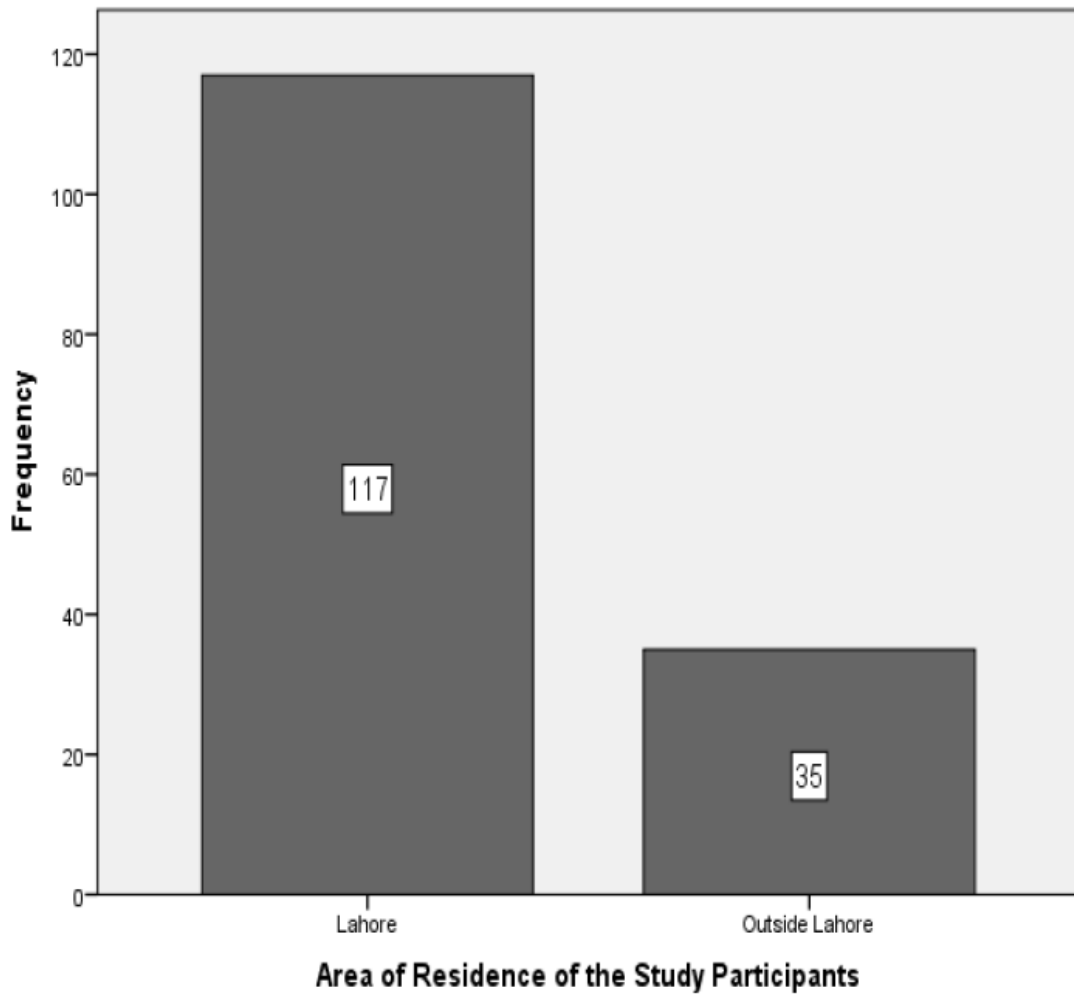


Figure 3.1. Age Distribution of the Study Participants

### Age distribution of the study participants

From all of the 152 study participants who participated in this study was calculated upon their living age. Three groups were made to estimate the age group of all of the study participants. The first group was made from 18 – 24 years of age. There were 79 number of study participants (62.2%) who were from the 18 – 24 years of the age. The second group was from 25 – 30 years of the age that had 31.5 percent of the study participants (n = 48) from all. The third group was from 31 years to 35 years of the age. In this group there were 25 study participants (16.4 %) who participated in this research study. The following figure is given to illustrate the age distribution of the participants.

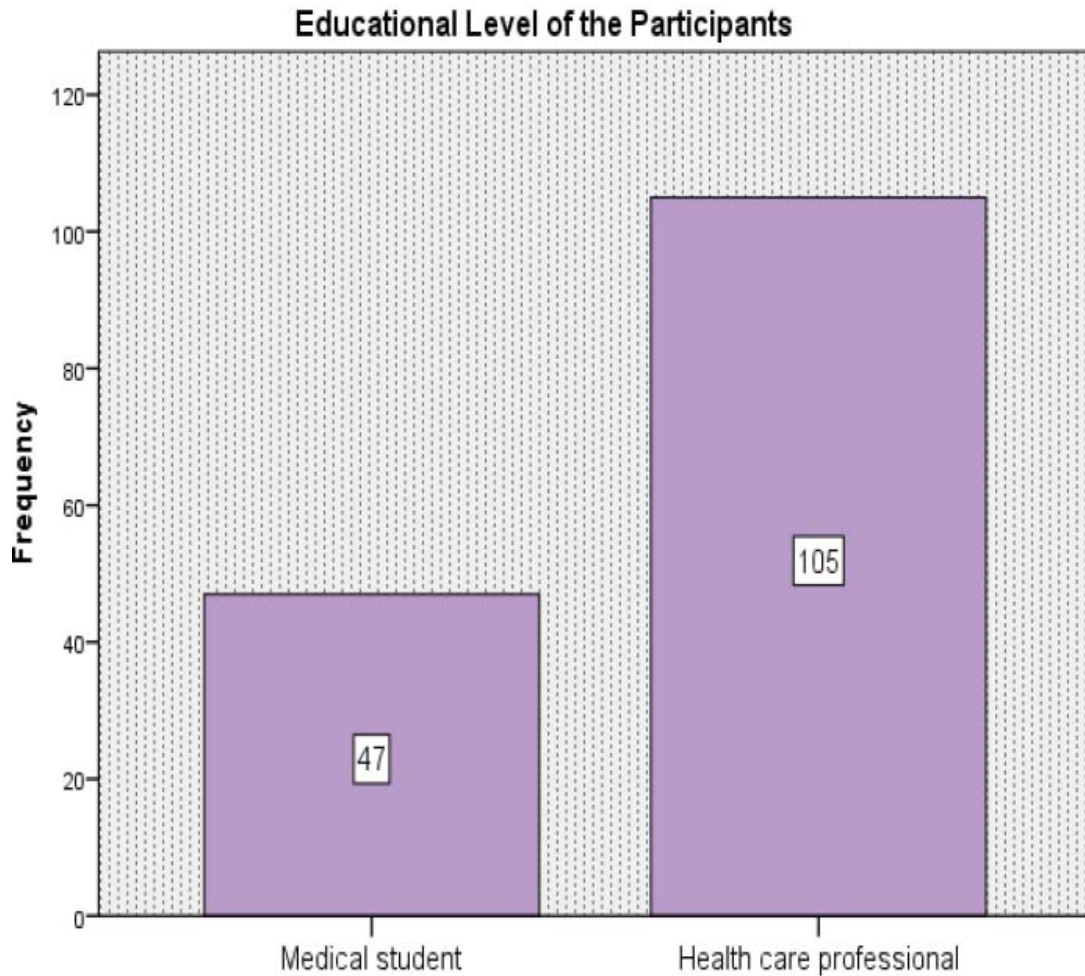


**Figure 3.2.** Area of Residence of the Study Participants

### **Educational status of the study participants**

Upon the educational status of the study participants it was revealed from results that there were 47 medical students (31.0 %) from the whole study population. The other study group was the rest of the health care professional working in the hospital setting which was 105 in numbers (69 %) from all of the study population. To illustrate it the following figure 3.3 is designed below.



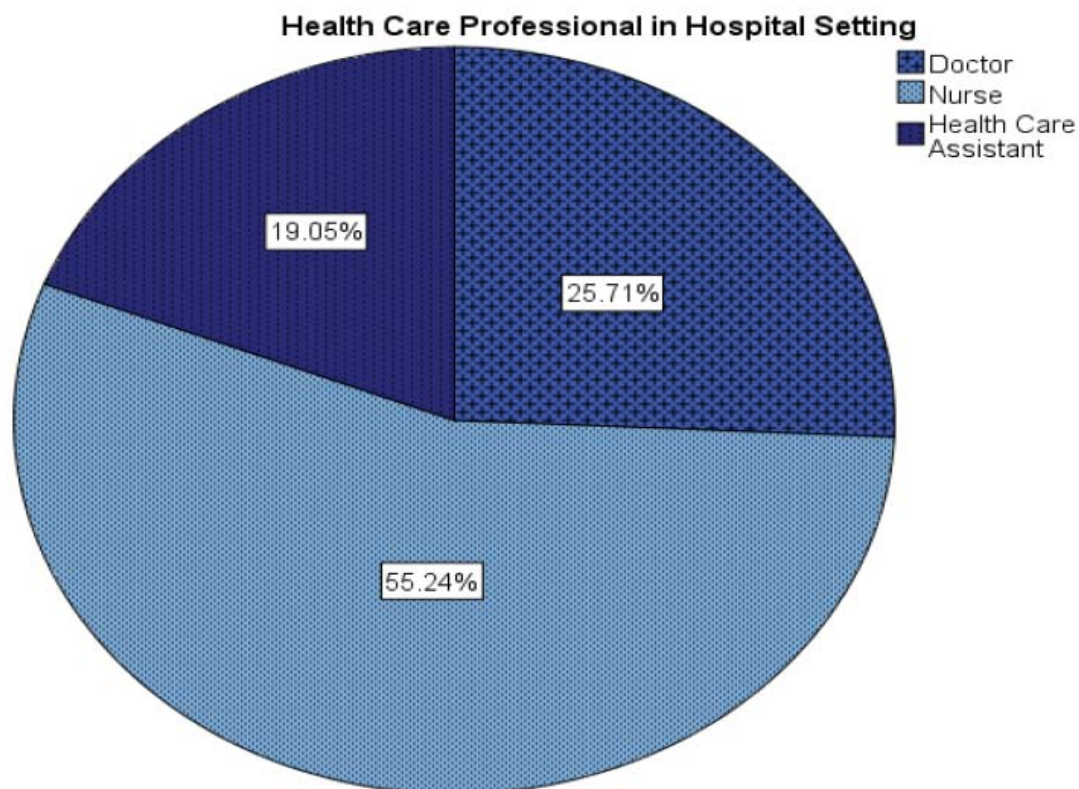


**Figure 3.3.** Educational Status of the Study Participants

### Health care professional under study

The other than medical students there were 105 health care professionals selected from the hospital setting as a study participant. The highest proportion was seen from the nurse which was 55.24 % (n = 58) from all health care professionals. The following table and figure 3.4 is showing all the domains

Health Care Professionals	Frequency	Percent
Doctor	27	25.7
Nurse	58	55.2
Health Care Assistant	20	19.0
Total	105	100.0



**Figure 3.4.** Health Care Professional under Study

### Area of residence of the study participants

The study participants were analyzed upon their area of residence. There were two groups made with respect to the area of residence. One in which the residents belong to the city of Lahore where this study was conducted and the second was any city other than Lahore. The diagrammatic presentation of the result is given below:

### Part 2. Knowledge regarding hand washing

#### Knowledge of advantages of hand washing

All of the 152 participants were asked about the knowledge of advantages of the hand washing. Surprisingly all of the study participants were aware about the advantages of hand washing. All of the medical students from first year selected the correct option about having the knowledge of hand washing.

**Table 3.4.** Knowledge of Advantages of Hand Washing

Study Participants	Frequency	Percent
Yes	152	100.0
No	00	00

#### Advantages of hand washing

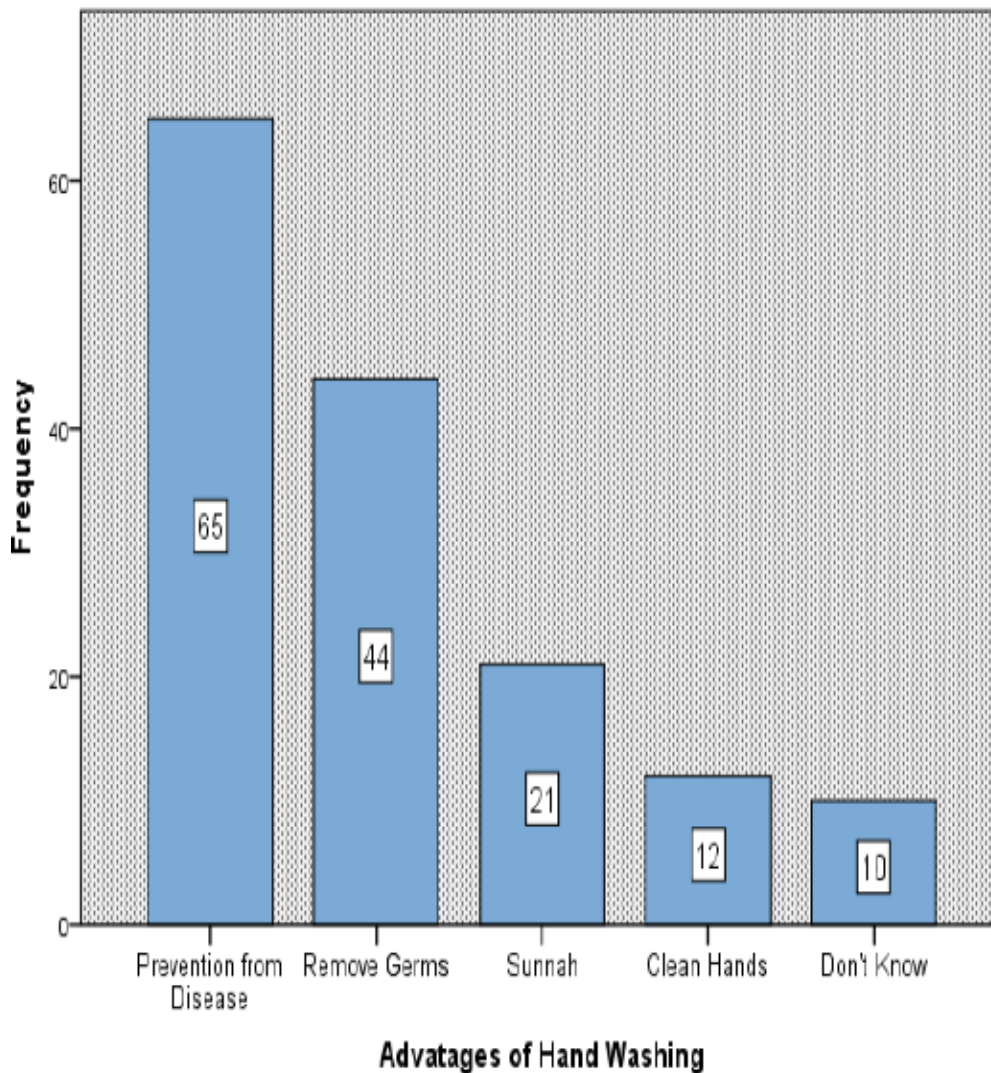
The study participants were asked about the advantages they know of hand washing. The query was about if they know there are advantages than what are the advantages they know are of hand washing. There were five frequently answered options of this question. These were divided into five advantages the students know of hand washing as shown in the table below:

**Table 3.5.** Advantages of Hand Washing

<b>Advantages of Hand Washing</b>	<b>Frequency</b>	<b>Percent</b>
Prevention from Disease	65	42.8
Remove Germs	44	28.9
Sunnah	21	13.8
Clean Hands	12	7.9
Don't Know	10	6.6
Total	152	100.0

From all of the study participants 42.8 percent of the study participants (n = 65) answered that it prevents from the diseases. It was the highest number of the study participants from all of the members. The second most chosen advantage was the removing the germs from hands if it will be hand washing. 44 study participants (28.9 %) selected this option while 21 of the students (13.8 %) assumed that washing hands is essential because it is Sunnah. While 12(7.9 %) and 10(6.6 %) students from all of the study participants thought that hand washing is necessary because it cleans the hands and other did not know what are the advantages of hand washing respectively.

The whole diagrammatic figure is shown as below:



**Figure 3.5.** Advantages of Hand Washing

### Disadvantages of not practicing hand washing

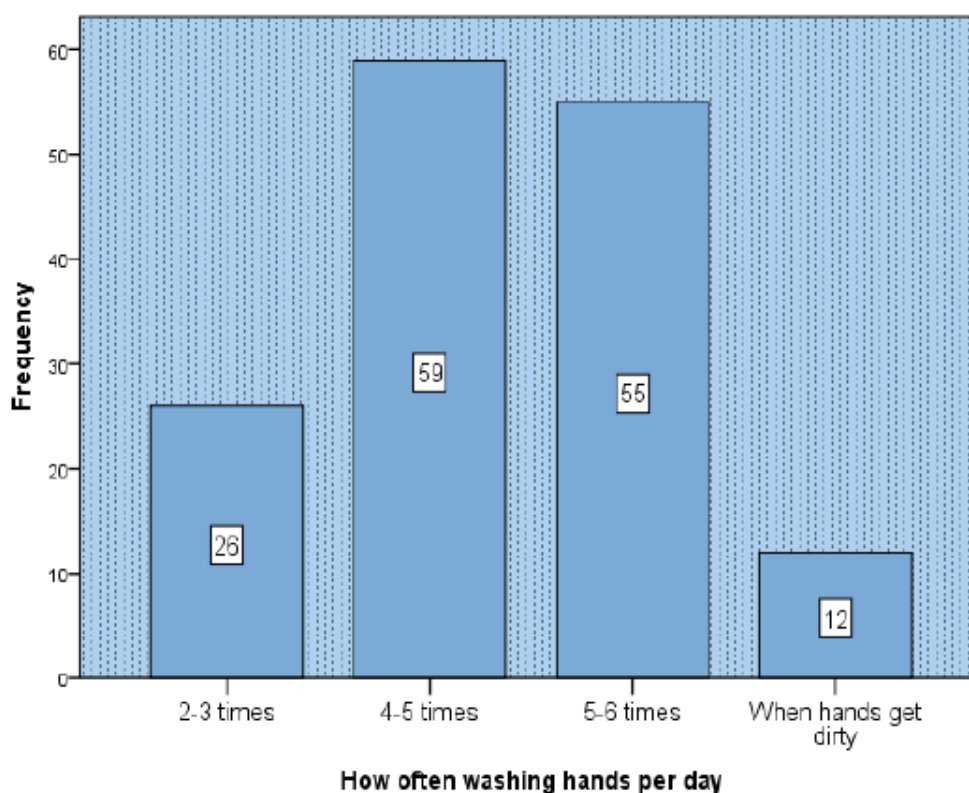
When study participants were asked about the various disadvantages of not practicing hand washing they answered in different aspects. 17 of the participants (11.2 %) was the lowest numbers of the study participants who did not know about the disadvantages of not practicing hand washing. The major part of the participants 41.4 percent (n = 63) believed that the disadvantage is risk of germs transmission from one person to another. 45 of the participants (29.6 %) assumed that it may lead to poor hygiene. 27 students (17.8 %) were those who thought that by not practicing hand washing may cause the hand to get dirty. Following table shows the whole calculation.

**Table 3.6.** Disadvantages of not Practicing Hand Washing

Disadvantages of not Practicing Hand Washing	Frequency	Percent
Dirty Hands	27	17.8
Risk of Germs Transmission	63	41.4
Lead to Poor Hygiene	45	29.6
Don't Know	17	11.2
Total	152	100.0

### Hand washing per day

Study participants were asked about how many times should hands be washed in one day. The answers were ambiguous due to that four classes were made of all of the answers. 17.1 % of the participants (n = 26) students answered that it should be from 2 – 3 times a day while 38.80 % of the participants (n = 59) proposed that it should be from 4 – 5 times a day. 55 students (36.1 %) supposed that it is 5 – 6 times a day and 7.8 percent (n = 12) declared that it should be as whenever needed.



**Figure 3.7.** Hand Washing per Day



### Conditions that need must hand washing

**Table 3.8** Conditions that Need must Hand Washing

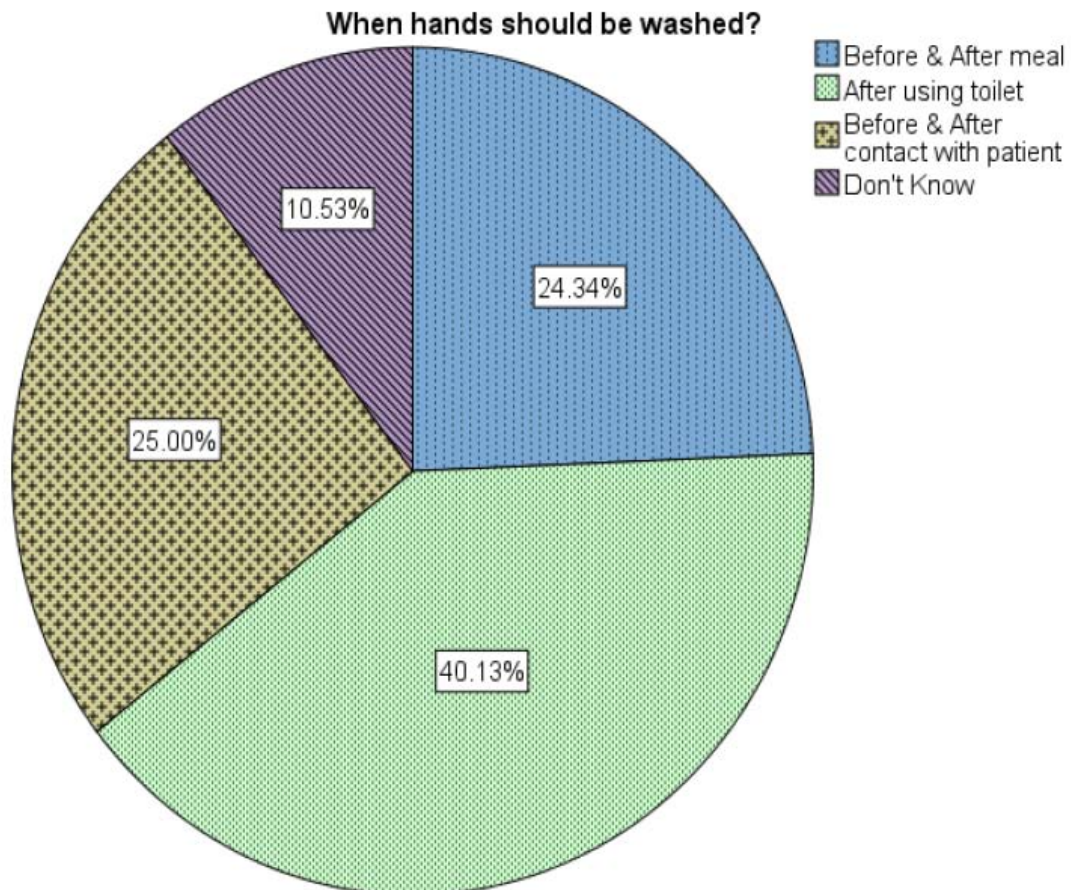
Conditions that Need must Hand washing	Frequency	Percent
Before & After meal	37	24.3
After using toilet	61	40.1
Before & After contact with patient	38	25.0
Don't Know	16	10.5
Total	152	100.0

Study participants proposed some of the conditions which are essential in washing hands and hand hygiene. 40.1percent of the population (n =61) advocated that it should be done after every time using toilet. It was the highest number of participants.

While the lowest number of participants were 16 in numbers (10.5 %) who did not know the conditions that need must hand washing. 37 were those (24.3 %) who anticipated that it should be done before and after taking meal.

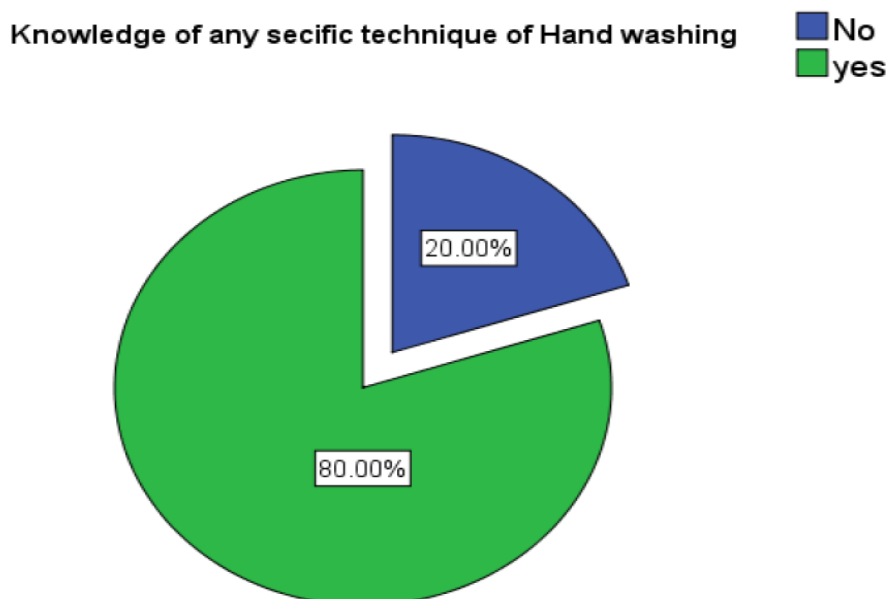
While only 25.0 percent (n = 38) suggested that it should be done before and after having a contact with patient.

Following figure iillustrate the whole calculation



### Knowledge of any specific technique of hand washing

Study participants were asked about the knowledge of any of the specific technique of hand washing. There were 122 study participants (80 %) who had the knowledge of any of the technique of hand washing proposed by any health agency. Unfortunately there were 30 study participants (20 %) who were not aware of any of the specific hand washing technique.



**Figure 3.9.** Knowledge of Any Specific technique of Hand Washing

### Part 3. Practice of hand washing by study participants

#### Hand washing practice by study participants

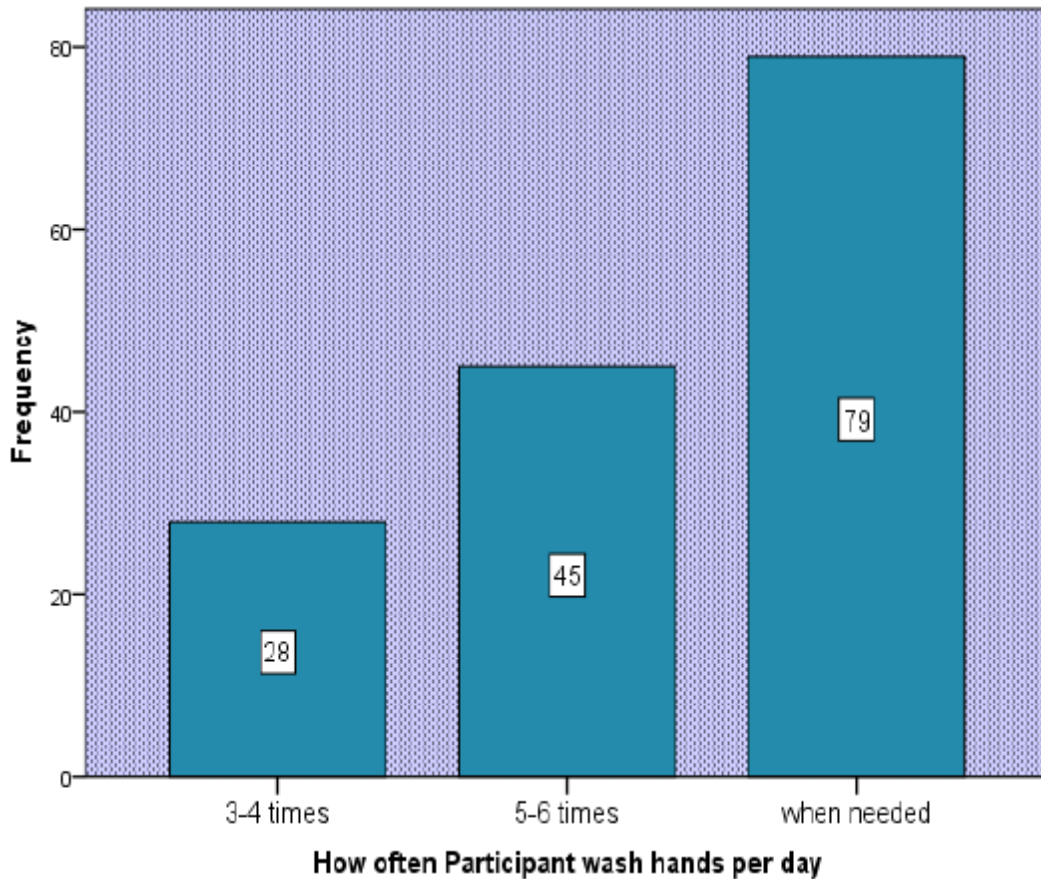
For the purpose of getting information regarding hand washing practice, all of the participants were asked about how many times they wash their hands per day in the normal routine. Most of the participants i.e. 46.7 percent (n = 42) answered that they wash their hands whenever it is needed. While 27 out of from all study population responded that it is 5 – 6 times a day they wash their hands. The least number of participants were 21 (23.3 %) who replied with the answer of washing hands 3 – 4 times per day. The table is given below for this calculation:

**Table 3.10.** Hand Washing Practice by Study Participants

Hand washing Practice per Day	Frequency	Percent
3-4 times	28	18.4
5-6 times	45	29.6
when needed	79	52.0
Total	152	100.0

#### Need of hand washing of study participants

With regard to hand washing practice the respondents were asked that what are the conditions in which hand washing practice should do necessarily. They were asked by their own perspective that what are the conditions in which they are washing their hands. 18.4 percent of the participants (n = 28) which was the least number of the participants replied that they are suggesting that there should be 3 – 4 times the hand washing done whereas 29.6 percent of the population (n = 45) responded that they wash their hands 5 – 6 times in a day. 79 participants (51.9 %) were those who told that they wash their hands whenever it is needed they are having the practice of hand washing. The illustration is given below

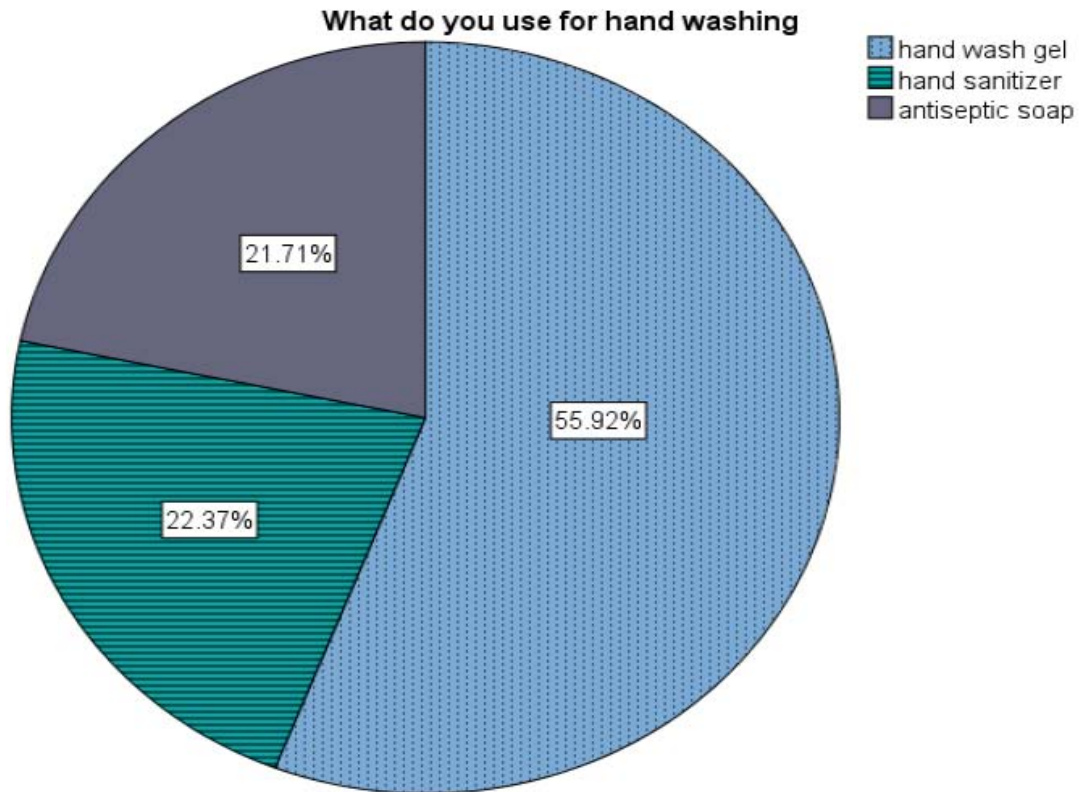


**Figure 3.11.** Need of Hand Washing of Study Participants

### Hand washing material

From the practice part of the questionnaire respondents were inquired about the washing material they are using for hand washing in their daily routine. 85 of the participants (55.9 %) replied that they are using hand wash gel for their daily routine hand washing. Whereas 34 respondents (22.4 %) replied that they were using hand sanitizer for their hand hygiene. 33 participants (21.7 %) were those using antiseptic soap for washing their hands. The table and figure about this is given below:

Hand Washing Material	Frequency	Percent
Hand wash gel	85	55.9
Hand sanitizer	34	22.4
Antiseptic soap	33	21.7
Total	152	100.0



**Figure 3.12.** Hand Washing Material

### **Hand wash material of choice**

In context of hand washing material study participants were asked that either they are using soap every time or the material of choice for hand washing. 64.44 percent of the respondents (n = 98) replied with the yes answer which indicate that they were using soap for hand washing. Whereas 35.5 percent of the study participants (n=54) responded with the answer no indicating that they were not using soap for the hand washing. The diagrammatic figure is given below:





**Figure 3.13.** Hand Wash Material of Choice

### **Time duration of hand washing**

Participants inquired about the time duration they are using for hand washing. 69 of the participants (45.3 %) answered that they are taking 15 – 30 seconds for washing their hands while 27 of the respondents (17.7 %) out of them told it is 31 – 45 seconds they take for washing their hands. There were 36 study participants (23.6 %) those replied that they are taking 40 – 60 seconds and 20 respondents (13.1 %) were those who told that they are taking more than one minute for washing their hands. The figure below illustrates this all:



**Figure 3.14.** Time Duration of Hand Washing

### **How they dry hands after hand washing**

It is important to know that with what our study participants were using to dry their hands after hand washing. They were asked about material they were using for drying of hands and 43.4 percent (n = 66) of the respondents replied that they were not using any thing to dry hands as they let it dry itself. While there were 38 number of study participants i.e 25 % were using tissue paper to dry their hands whereas 31 respondents (20.3 %) using towel to dry their hands. Only 11.1 percent (n=17) were those who were using air warmer to dry their hands. The figure is given below about this calculation:

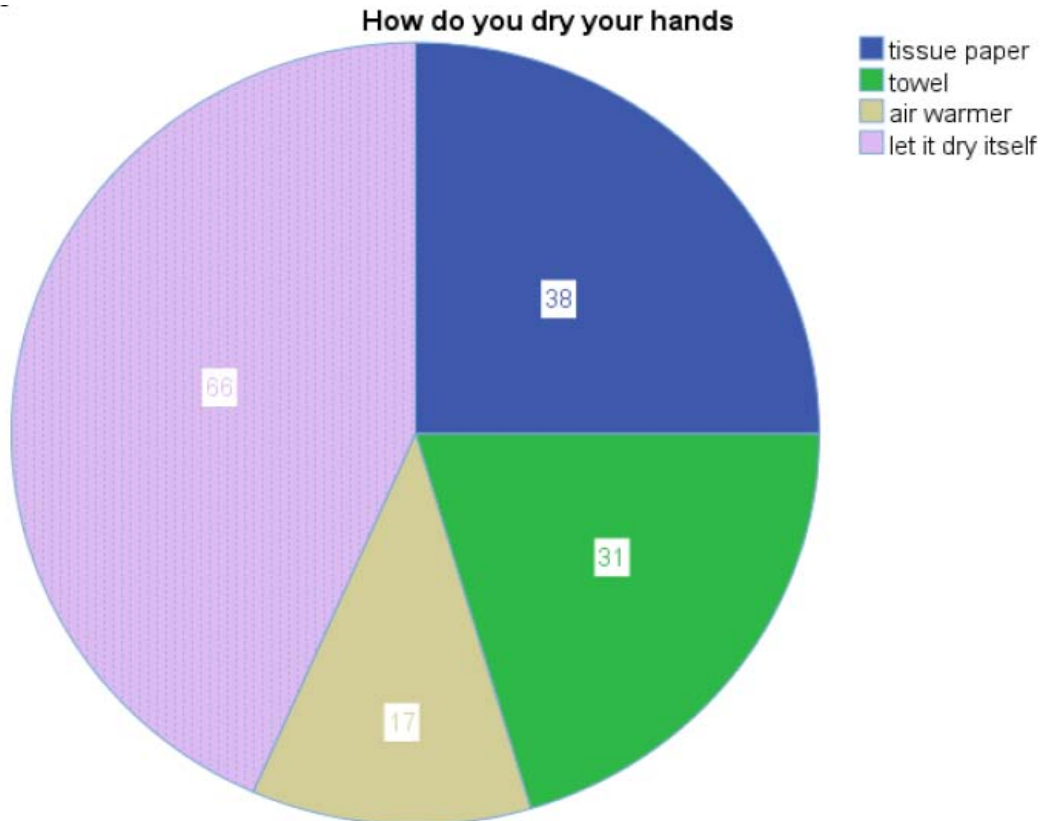


Figure 3.15. How They Dry Hands after Hand Washing

### Gender wise knowledge of hand washing techniques

The gender wise knowledge of the participants were find out and their association were checked by cross tabulation and chi – square value were determind to see the association by keeping in consideration of p – value.

Table 3.16. Gender wise Knowledge of Hand Washing Techniques

Gender of the Participants	Knowledge of any specific technique of Hand Washing		Total	Chi-Square	p-Value
	No	Yes			
Male	35	55	90	7.031	0.007
Female	13	49	62		
Total	48	104	152		

Results showed that female students were had more knowledge about the various techniques of hand washing regardless of the male students. The p – value 0.007 indicated the association between these two factors which was less than 0.05.

### Genderwise practice of hand washing

Hand washing practice was seen in both gender and the association was find out by using chi-square analysis and p-value was calculated from it.

From results it was seen that the handwashing practice in males were more upon the basis of whenever need of hand hand washing. While in the females the practice was seen more for 5 – 6 times a day.

**Table 3.17.** Genderwise Practice of Hand Washing

Gender of the Participants	How often Participant wash hands per day			Total	Chi-Square	p-Value
	3-4 times	5-6 times	When Needed			
Male	22	28	45	95	3.124	0.08
Female	12	18	27	57		
Total	34	46	72	152		

### Gender distriution and use of hand washing material

The use of various types of hand washing materials were analyzed in context of gender wise usage. There was a mixed result taken from the calculations which showed a positive association of the two study variables on each other.

It was described upon the evidence of p-value which was 0.035 indicating a positive association of the two study variables. The statistical test used for this calculation was chi-square showing a value of 6.725.

The most used hand wash material was hand wash gel by male and female study participants which was 42 and 43 respectively. The following table 3.18 describes the all calculation about this cross tabulation,

**Table 3.18.** Gender Distribution and Use of Hand Washing Matrial

Gender	Hand Washing Material			Total	Chi-Square	p-Value
	Hand wash gel	Hand sanitizer	Antiseptic soap			
Male	42	19	25	86	6.725	0.035
Female	43	15	8	66		
Total	85	34	33	152		

### Discussion

The knowledge about good hand washing practices and compliance of the its practice according to WHO guidelines amongst health care workers is essential for lowering the health care associated infections, nosocomial infections, cross-transferring and contegious infections. Although hand washing is a very simple procedure and has long been deemed one of the most important infection control measures, the compliance rates by health care workers are generally reported to be low.

Health-care workers were much less likely to perform hand hygiene if a peer or a higher ranking person in the room did not perform hand hygiene. Compared to health-care workers who entered a room alone, group behavior did not seem to improve if the higher ranking person or peer did wash their hands. Although these findings suggest that hand-hygiene

behaviors can be affected by role model or peer hand-hygiene compliance, learned behaviors or time constraints may negatively influence group compliance with hand-hygiene procedures.

The results of this study revealed that most of the medical students and other health care providers are aware about the benefits of hand washing and hand hygiene. This finding is lower than that reported in other studies done via a similar method in other medical institutes because of the sample size variations and most particularly we selected the some of the students of MBBS which were not in the hospital clinical practice.

According to CDC guidelines on hand hygiene, washing hands with water and regular soap is the best available method to decrease the number of microbes on them in the vast majority of circumstances (Hamadah et al., 2015). In our study, 85 study participants (55.9 %) correctly answered about the use of the hand washing gel they were using for antiseptics as compared to the other group who were using hand sanitizer which was 34 (22.4 %). When water and soap are unavailable, which can be the case in several occasions in healthcare settings, health care workers in hospital settings should look for an alternative, such as hand sanitizers. Study participants exhibited several major misconceptions regarding the use of hand sanitizers.

This can generally be attributed to the health care professional's lack of knowledge regarding various hand washing materials now available and using in so many developed systems. In addition, health care providers in the hospital setting should be aware that traditional hand washing (water, plus regular soap) has been demonstrated to be more effective at inactivating and eliminating particular kinds of germs, such as clostridium difficile-associated infections in suspected individuals or the patients.

This is a piece of information that can be easily missed by physicians, nurses, and medical students. As in our study when health care providers and medical students were asked about the usage of soap for hand washing only 64.4 percent (n = 98) revealed that they were using soap for washing their hands however 54 of the study participants (35.6 %) were not using soap anymore for washing their hands Likewise, in a Chinese study conducted by Won et al., 2004 in which only 23.5% of the study participants responded correctly.

The study participants showed appropriate awareness of hand hygiene in terms of indications and techniques. Hand hygiene should be performed before and after each patient encounter (regardless of performing physical examination), and 122 respondents (80%) answered this question correctly as they knew the any of the specific techniques of hand washing according to the parameters and considerations while 20 percent of the study participants (n = 30) were unaware about any of the hand washing technique.

In our study, all of the health care providers along with the medical students showed positive attitudes towards hand hygiene to control and eliminate the health care associated infections, nosocomial infections, cross-transferring and contagious infections. More than 90% of the study participants agreed that "Proper hand hygiene is an important matter to be emphasized in medical curricula and healthcare centers to control and eliminate health care associated infections, nosocomial infections, cross-transferring and contagious infections" and that "Improper hand hygiene significantly contributes to a patient's morbidity and mortality and causing a significant increase in the burden of the disease".

The statistical calculations revealed that there were more female study participants (79.9 %) who have had a better knowledge and understandings of any of the specific technique of hand hygiene and hand washing practices as compared to male members of the study (61.1 %) which were have a less knowledge of hand hygiene and hand washing practices. It was seen that the most used material by both male and female study participants was hand wash gel which was 48.8 percent and 65.1 percent respectively from all of the used hand wash materials.

It showed a positive association (p-value = 0.035) indicating that most of the health care providers are practicing a proper way to save contaminated and communicable infections to the patients and other health care providers. Same likely most of the study participants (47.3

%) suggested that hand washing should be done whenever it is needed. Similarly the answer for this question from female participants (47.3 %) were in the favor of hand washing whenever it is needed in the taking care of the patients and dealing with other co-workers and health clients.

It is of high significance to spread the awareness about hygiene among undergraduate clerkship medical students as this will be reflected on their behaviors later on when they become professional healthcare providers.

## Conclusions

The health care providers from all department working in the hospital setting along with the medical students have misconceptions regarding hand washing, hand hygiene, its pros and cons due to inappropriate knowledge.

The doctors, nurses, managers, and medical teachers should include hand hygiene and hand washing in their subjective operating protocols (SOP's), curricula and some sessions and continue clinical education programs for the sake of sharing knowledge about hand washing and hand hygiene along with infection or disease control.

Public responsiveness by campaigns about hand hygiene must be encouraged. With all awareness about hand washing the focus on practice should be made possible to be operated by health care professionals and medical students. The more adherence to the practice of hand hygiene and hand washing there will be the more prevention from the repeated infections to the health care professionals, workers and most important to the patients.

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