

The Knowledge, Attitudes and Practices of Dental Surgeons Towards Infection Prevention and Control Practice in Selected Private Dental Clinics in Colombo District, Sri Lanka

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ABSTRACT

➤ **Background:**

Infection prevention and control (IPC) is an essential component of safe dental practice because dental procedures frequently involve exposure to blood, saliva, body fluids, and aerosols, creating potential risks for transmission of infectious diseases. Dental surgeons therefore require adequate knowledge, appropriate attitudes, and consistent IPC practices to protect both patients and healthcare workers. However, evidence regarding IPC among dental surgeons working in private dental clinics in Sri Lanka is limited.

➤ **Objective:**

To assess the knowledge, attitudes, and practices of dental surgeons towards infection prevention and control in selected private dental clinics in the Colombo District, Sri Lanka, and to identify factors associated with these domains.

➤ **Methods:**

A quantitative descriptive cross-sectional study was conducted among dental surgeons practising in selected private dental clinics in the Colombo District. Sri Lanka Medical Council-registered dental surgeons with at least one year of experience in private dental practice were eligible for participation. Data were collected using a structured self-administered questionnaire covering socio-demographic characteristics, knowledge, attitudes, and IPC practices. Ninety dental surgeons were invited to participate, of whom 65 responded, giving a response rate of 72.2%. Data were analysed using the Statistical Package for the Social Sciences (SPSS). Descriptive statistics were used to summarize participant characteristics and knowledge, attitude, and practice scores, while associations between selected characteristics and IPC domains were assessed using appropriate statistical tests.

➤ **Results:**

Among the 65 participants, 49.2% were aged 45–54 years and 64.6% were male. Most participants (58.5%) had a bachelor's degree as their highest educational qualification, while 41.5% had additional postgraduate or other qualifications. The mean knowledge score was 11.6 (SD 3.8), with 60.0% of participants classified as having good knowledge. The mean attitude score was 31.9 (SD 4.4), with 60.0% demonstrating a good attitude towards IPC. The mean practice score was 7.6 (SD 1.9), and 67.7% demonstrated good IPC practices. A statistically significant association was observed between age and knowledge of IPC, with participants aged below 45 years having a higher proportion of good knowledge than those aged 45 years or older (75.9% vs. 47.2%, $p=0.02$). No statistically significant associations were identified between the examined socio-demographic or professional characteristics and attitudes or practices.

➤ **Conclusion:**

The study found that the selected dental surgeons demonstrated generally good levels of knowledge, attitudes, and practices regarding infection prevention and control. However, the significantly lower level of knowledge observed among older dental surgeons highlights the importance of continuous professional education and updating of IPC knowledge. Further studies involving larger and more representative samples are recommended to provide broader evidence on IPC practices among dental surgeons in Sri Lanka.

Keywords: *Infection Prevention and Control; Dental Surgeons; Knowledge; Attitudes; Practices; Private Dental Clinics; Sri Lanka; Colombo District.*

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CHAPTER ONE

INTRODUCTION

➤ *Background*

The elements of Infection prevention and control (IPC) are paramount in the specialty of Dentistry. Especially in dental procedures, patients and, to a certain extent, dental surgeons expose themselves to blood, saliva, and other body fluids, making various infectious diseases likely to be transmitted (Jain et al., 2010). According to the WHO, IPC has been recognized as a key practice in the care of patients and the protection of healthcare workers in healthcare facilities against infections. In dental clinics, IPC practices play a significant role in avoiding the spread of diseases like hepatitis B and C and human immunodeficiency virus (HIV) among other illnesses.

The implementation of strict IPC measures in the surgery requires the engagement of dental surgeons to ensure everything proceeds as per the laid down guidelines (McCarthy and Britton, 2000). The population accessing dental clinics increased and a large number of patients consult the dental clinics daily, especially in urban settings such as the Colombo District in Sri Lanka. A high turnover of patients is also likely to result in cross-infection or transmission of diseases if ever proper IPC measures are not observed (Younai, Murphy, and Kotelchuck, 2001). Hence, it is crucial to evaluate the degree of knowledge, attitude, and perception (KAP) of dental surgeons about IPC for retrieving the practices' deficiencies.

The precautionary level operating in dental facilities includes various activities meant to avert the spread of the disease. Some preventive measures include wearing goggles, face shields, gloves, and protective clothing; [personal protective equipment] proper reprocessing of dental instruments; washing of hands; and disinfection of various dental equipment and tools. It is a noble effort in the prevention and control of infection by both patients and workers in dental health facilities (Sofola et al., 2007). The research proposal is to study dental surgeons' knowledge, attitude, and practice regarding IPC in some selected private dental clinics in the Colombo District, Sri Lanka. Hence, this study is coming at the right time due to the rising cases of HAIs and the demand for effective IPC practices in the dental field. Emphasis on the research on private dental clinics will reveal accurate information regarding the current IPC practices and the possible gap areas in training and resources.

Like other countries, Sri Lanka has common issues of ensuring high IPC practice adherence in healthcare facilities, including dental clinics. The Colombo district is highly urbanized and as a result, has numerous dental clinics that treat patients from all sectors of society. Thus, knowing the level of KAP of dental surgeons in this region will enable the promotion of effective IPC practice regarding instrument sterilization among the identified dentists to improve the outcomes (Wicker and Rabenau, 2010). Furthermore, this research contributes to The Sphere Project, the World Health Organization's, and other international organizations' efforts to enhance IPC measures that would lessen the load of infectious diseases.

To that end, the following objectives were developed for this study: This study is important as it will offer vital information towards assessing the level of IPC practiced in the private dental clinics in Colombo at the present times. The results of the study will be useful for policy and training purposes to enhance IPC in dental healthcare facilities; hence, contributing to the patient-safety improvement and the creation of a safer environment for dental healthcare workers. In addition, the research will help to enrich the existing knowledge base on IPC in dentistry and become a reference point for further research and activities in similar environments.

➤ *Justification*

IPC as an important concept of patient safety and public health plays a significant role in dental treatment facilities. However, in the course of this study, the research discovered that, even with improved dental care equipment and procedures, patients are still at risk of acquiring HAIs (Nagao et al., 2008). As cautioned by the WHO, IPC strategies are still paramount to preventing the spread of infections in and around healthcare facilities including dental facilities. This research is concerned with the Colombo District which is Sri Lanka's largest and has a concentration of private dental clinics in which IPC has implementation issues and prospects.

HAIs have emerged as major threats to global health, lengthening patients' hospital stays, raising mortality rates, and, consequently, escalating healthcare expenditures (Rahman et al., 2013). In dental care practice, communicable diseases that are a concern include; hepatitis B & C, HIV, and even other blood-borne pathogens. Periodontal surgeries cause aerosols and splatter with infectious agents; the dedicated IPC protocols should be strictly followed.

Sri Lanka has achieved some improvements on the index related to health; yet, the healthcare system needs some further advancement in combating infection. However, several challenges have been observed in this study; The Colombo District is one of the densely populated areas, and being an urban center, the patient turnover of dental clinics is high and there is every possibility for cross infection. About 12 percent of dental patients suffered post-treatment infection as stated by the Sri Lankan Ministry of Health, a factor which indicates the coercive need to heighten IPC measures.

Nevertheless, to the best of the author's knowledge, there is a paucity of empirical literature available in the context of Sri Lankan dental surgeons' practices and perceptions of IPC. There is likely suboptimal compliance with IPC measures and key

practices due to possible discrepancies in training and the availability of resources and awareness (de Amorim-Finzi et al., 2010). Thus, this study proposes to provide a complete assessment of the KAP of dental surgeons in the Colombo District to properly address the knowledge gap associated with the information. In this context, by describing the current situation of IPC practices, the research can pave the way for interventions and policies.

The following are some of the complications likely to occur when adequate infection control measures are not observed in dental clinics. Such inclusions are the rising rate of infection among patients and healthcare practitioners which is costly for the healthcare system. Infections that occur in the dental environment may be expensive to treat, have to go for other medical treatment, be hospitalized for a longer time, and loss of productivity. Recurrent cases of HAIs also impact the trust of the population in the dental healthcare system, which in effect influences oral health. Furthermore, dental healthcare workers are prone to infection hazards exposed through their workplace, therefore indicating that infection control measures are mandatory for their benefit.

The conclusions which will be derived from this study will have a great impact on policy and practice. Thus, synthesizing the current KAP study on dental surgeons towards IPC will provide quantitative data needed to design a relevant training programme and guidelines for private dental clinics in the Colombo District. Further, the research will point out gaps that would require human and financial resources to improve IPC practices.

➤ *Problem Statement*

The fairly large Colombo District of Sri Lanka is in dire need of key information on the knowledge, attitudes, and practices of dental surgeons with special reference to IPC. Such knowledge deficits pose a threat to patient safety and the wellbeing of the dental healthcare personnel (Bentley, Burkhart, and Crawford, 1994). Currently, the practices regarding IPC implemented among the dental surgeons in these private clinics are not well documented which is unsettling because along with high risk for cross-transmission of infections like hepatitis B, hepatitis C, and HIV, the dental care providers are also at a high risk for getting infected with several communicable diseases. This should be encouraged because a lack of efficient IPC practices compromises the lives of the patients and healthcare workers since patients are likely to be affected by HAIs (Mutters et al., 2014). The purpose of this research is to establish the current knowledge, attitude, and practice among the dental surgeons in selected private dental clinics, in the Colombo District, to configure and upgrade the IPC knowledge, skills, and patient health status in the dental environment.

➤ *Problem Analysis (Include Cause and Effect Diagram)*

IPC plays a significant role for patients and any healthcare workers who may come in contact with the dental clinic. However, literature addressing the KAP of dental surgeons in private dental clinics in the Colombo District of Sri Lanka is scarce. This problem has a multifactorial origin, namely the absence of appropriate educational programs, insufficient training, funding, and equipment, unfavorable attitude, legislative void, and insufficient postgraduate training. Weak IPC measures cause undesirable consequences such as higher infection rates, new occupational health threats, new financial costs, and the erosion of public confidence. HCWs providing dental care are likely to be exposed to infectious agents at their workplace, especially when internally promoted IPC measures are suboptimal. Thus, the economic burden of infections that originate from dental practice encompasses treatment costs, prolonged hospitalization, and work absenteeism. These costs could be high in the case of diseases that strike children therefore having a toll on both the patient and the health sector.

To treat these roots, social treatments including education, provision of fresh resources, and enforcement of legislation among others are crucial. To address these fundamental issues, means of interventions such as better education, better provision of resources, and appeals to code of conduct, healthcare IPC practices, and subsequently patient and healthcare worker's safety must be improved on. The dearth of IPC practices among dental surgeons in the private dental clinics in the Colombo District could therefore be attributed to several problems; which include; absence of standardized training among dental surgeons after their graduation and inadequate regulation. Education, resources funding, and regulation are some of the ways that should be used to address such root causes to improve IPC practices and protect both the patient and healthcare workers.

➤ *Research Questions*

- What is the level of knowledge of dental surgeons in private dental clinics in the Colombo District regarding infection prevention and control measures?
- What are the attitudes of dental surgeons in private dental clinics in the Colombo District towards infection prevention and control measures?
- What infection prevention and control practices are currently being implemented by dental surgeons in private dental clinics in the Colombo District?

➤ *Objectives*

• *General Objective*

To assess the knowledge, attitudes, and practices of dental surgeons towards infection prevention and control in selected private dental clinics in the Colombo District, Sri Lanka.

- *Specific Objectives*

- ✓ To evaluate the level of knowledge among dental surgeons in private dental clinics in the Colombo District regarding infection prevention and control measures.
- ✓ To analyze the attitudes of dental surgeons in private dental clinics in the Colombo District towards the importance and implementation of infection prevention and control measures.
- ✓ To examine the current infection prevention and control practices being implemented by dental surgeons in private dental clinics in the Colombo District.
- ✓ To recommend strategies for improving infection prevention and control practices among dental surgeons in private dental clinics in the Colombo District based on the study findings.

CHAPTER TWO LITERATURE REVIEW

The purpose of the literature review is to thoroughly comprehend the existing knowledge, attitudes, and practices of dental surgeons about infection prevention and control (IPC) in dental settings. This chapter aims to consolidate empirical research results, specifically highlighting topics pertinent to the study. These themes include the significance of infection prevention and control (IPC) in dentistry practice, the level of knowledge and awareness of IPC protocols, attitudes towards IPC measures, the execution of IPC practices, and the obstacles that hinder successful IPC (Alavian et al., 2011). The evaluation will also analyze the procedures used in the pertinent investigations to emphasize the strengths and weaknesses of the current study.

➤ *The Significance of Infection Prevention and Control in Dental Practice*

Implementing infection prevention and control (IPC) measures is of utmost importance in dental practice, since there is a significant danger of cross-infection between patients and dental healthcare workers (Alavian, Mahboobi, and Mahboobi, 2011). Dental operations often include contact with blood and saliva, which may serve as a means of transmitting infectious agents such as hepatitis B and C, HIV, and respiratory viruses. Harte's study underscored the need to follow IPC procedures to reduce these dangers and guarantee the safety of both patients and healthcare providers (Alavian, Mahboobi and Mahboobi, 2011).

The research mainly included cross-sectional surveys and observational studies to evaluate the infection prevention and control (IPC) procedures among dental healthcare practitioners. These approaches are efficient in collecting data in real-time and provide a glimpse into current behaviors, however, they may not capture long-term changes or the whole extent of adherence to infection prevention and control measures (Bwogi et al., 2009).

➤ *Understanding and Familiarity with IPC Protocols*

Multiple studies have examined the extent of knowledge and awareness of infection prevention and control (IPC) methods among dental surgeons. Researchers conducted a study on dental professionals in Iran and discovered that while most participants had awareness of general infection prevention and control (IPC) principles, there were notable deficiencies in their understanding of particular practices, such as hand hygiene and sterilizing procedures (Bwogi et al., 2009).

Similarly, a study conducted in Saudi Arabia used a self-administered questionnaire to evaluate the level of understanding that dental students had on Infection Prevention and Control (IPC) (Askarian and Assadian, 2009). The research revealed that although students have a broad comprehension of IPC concepts, their knowledge often remained theoretical and was not consistently applied in practical situations. Questionnaires used in this research provide useful insights on the knowledge foundation of dental practitioners, but, the self-reported nature of the data may introduce bias (Health, 2011).

➤ *Perceptions of IPC Measures*

Dental surgeons' compliance is highly influenced by their attitudes about IPC measures. A cross-sectional survey conducted by Gambhir et al. (2011) in Canada examined the opinions of dental hygienists towards IPC. The results indicated that those who had good views about IPC had better levels of compliance. Nevertheless, the research also observed that some professionals saw IPC procedures as being time-consuming and unnecessary, highlighting the need for further education and interventions aimed at changing attitudes (Ogden et al., 1997).

Further research done in the United States by Cadmus et al. (2010) included a mix of questionnaires and focus groups to get insights into the views of dentists about IPC. The utilization of a mixed-method approach allowed a more comprehensive comprehension of the variables that impact attitudes, including perceived obstacles and enablers to adherence in infection prevention and control (IPC). The use of methodological triangulation enhanced the study's conclusions by using both quantitative and qualitative data.

➤ *Implementation of IPC Practices*

There is significant variation in the adoption of IPC practices among dental practitioners, as shown by many research. An instance of this is the study conducted by Here is the in-text citation in Harvard style for the given study Gershon et al. (1995) in South Africa, where they used direct observation and interviews to evaluate the implementation of Infection Prevention and Control (IPC) measures in dentistry clinics. The research revealed that while the majority of clinics had implemented infection prevention and control (IPC) measures, compliance was irregular, especially in settings with minimal resources (Rhodes et al., 2008).

Bellei et al. (2007) conducted research in Jordan that assessed IPC compliance via the use of structured observations and questionnaires. The findings revealed that although fundamental infection prevention and control (IPC) measures, such as the usage of gloves, were often adhered to, more intricate protocols, such as tool sterilization, were frequently overlooked. The use of both observational and survey techniques yielded a complete perspective on the application of IPC. However, it also highlighted the difficulties in attaining constant adherence (de Souza et al., 2006).

➤ *Barriers to Effective IPC*

It is essential to identify obstacles to successful Infection Prevention and Control (IPC) to create specific solutions. Gale (2004) conducted research in Nigeria where they used semi-structured interviews to investigate the difficulties encountered by dental practitioners in the implementation of infection prevention and control (IPC) measures. The research revealed many obstacles, such as insufficient resources, poor training, and restricted availability of up-to-date IPC guidelines (Kohn et al., 2003).

Similarly, a study conducted by Batista et al. (2006) in the United States used questionnaires to evaluate the obstacles that dental practitioners have in adhering to infection prevention and control (IPC) measures. The results indicated common problems, including limited time, perceived expenses, and inadequate administrative backing (Milward and Cooper, 2007). To overcome these obstacles, a comprehensive strategy is needed, which involves implementing legislative reforms, allocating resources, and providing continuous education and training.

➤ *Methodological Approaches in IPC Research*

IPC research often uses cross-sectional surveys, observational studies, and mixed-method techniques as its methodology. Cross-sectional surveys, as shown by Gershon et al. (1998), are efficient in gathering data from large samples and provide a momentary overview of prevailing behaviors and attitudes. Nevertheless, their effectiveness is limited by their incapacity to record temporal variations and possible biases in self-reporting (Yüzbaşıoğlu et al., 2009).

Observational studies, such as those carried out by Halboub et al. (2015) provide direct insights into infection prevention and control (IPC) methods. However, these studies may be demanding in terms of resources and may not always be practical in every context. Utilizing a mixed-method approach, the research conducted by (Qureshi, Siddiqui, and Macfarlane, 2005) integrates the advantages of quantitative and qualitative methodologies to provide a more thorough comprehension of challenges related to interprofessional collaboration (IPC).

The literature review emphasizes the crucial significance of Infection Prevention and Control (IPC) in dental practice and identifies the current deficiencies in knowledge, attitudes, and practices among dental surgeons. Although there has been notable progress in promoting IPC, there are still obstacles to overcome, especially in maintaining constant compliance and tackling implementation difficulties (Cook et al., 2007). Future research should prioritize conducting longitudinal studies to observe and analyze changes that occur over time, as well as investigate the efficacy of specific treatments aimed at enhancing infection prevention and control methods (Chen and Gluud, 2005). The procedures used in the examined studies give a strong foundation for undertaking this research, while the utilization of methodological triangulation and mixed-method approaches may yield more thorough insights (Singh et al., 2011).

CHAPTER THREE METHODOLOGY

➤ Conceptual Framework

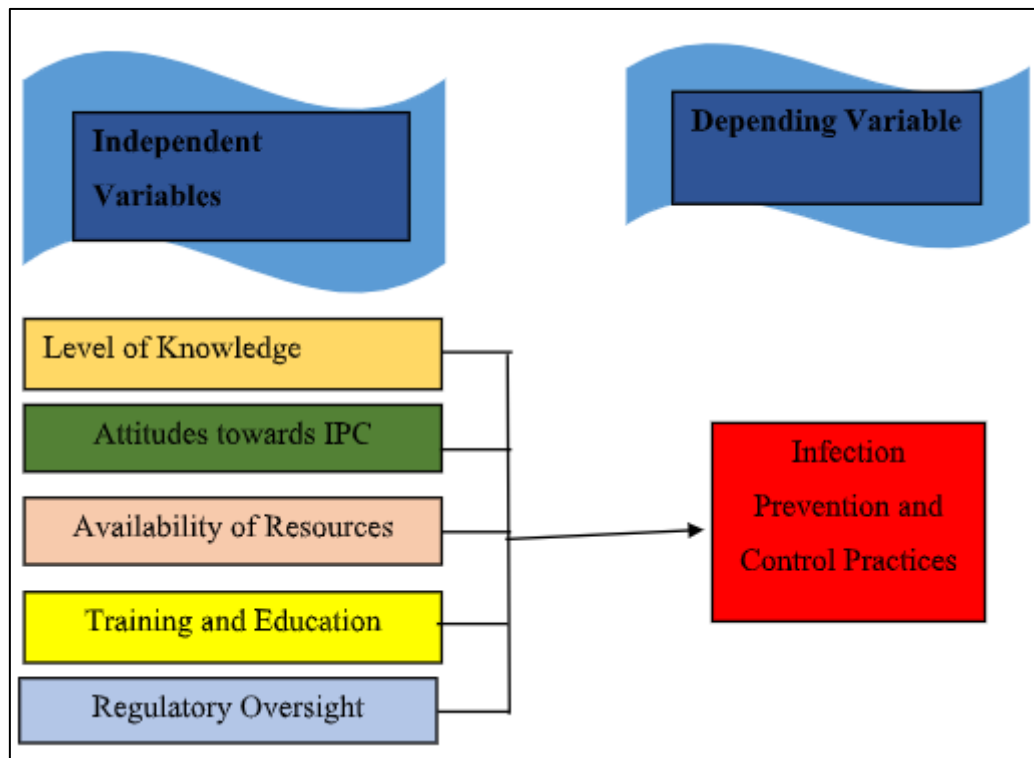


Fig 1Conceptual Framework

➤ Hypothesis

- H1A: There is a significant positive relationship between the level of knowledge of dental surgeons and their infection prevention and control practices in private dental clinics in the Colombo District.
- H10: There is no significant relationship between the level of knowledge of dental surgeons and their infection prevention and control practices in private dental clinics in the Colombo District.
- H2A: Attitudes towards infection prevention and control measures significantly impact the adherence to IPC practices among dental surgeons in private dental clinics in the Colombo District.
- H20: Attitudes towards infection prevention and control measures do not significantly impact the adherence to IPC practices among dental surgeons in private dental clinics in the Colombo District.
- H3A: The availability of resources significantly influences infection prevention and control practices among dental surgeons in private dental clinics in the Colombo District.
- H30: The availability of resources does not significantly influence infection prevention and control practices among dental surgeons in private dental clinics in the Colombo District.
- H4A: The level of training and education received by dental surgeons on IPC protocols significantly correlates with their infection prevention and control practices in private dental clinics in the Colombo District
- H40: The level of training and education received by dental surgeons on IPC protocols does not significantly correlate with their infection prevention and control practices in private dental clinics in the Colombo District
- H4A: Regulatory oversight of infection prevention and control practices significantly affects the adherence of dental surgeons to IPC guidelines in private dental clinics in the Colombo District.
- H40: Regulatory oversight of infection prevention and control practices does not significantly affect the adherence of dental surgeons to IPC guidelines in private dental clinics in the Colombo District

➤ *Operationalization of Variables*

Table 1 Operationalization of Variables

Concept(s)	Variables	Sub-variables	Question Type
Level of Knowledge	Knowledge about IPC measures	Understanding of IPC guidelines	Multiple Choice
		Awareness of infection risks	Likert Scale
Attitudes Towards IPC	Attitudes towards IPC importance	Perception of IPC effectiveness	Likert Scale
		Belief in the necessity of IPC	Likert Scale
Availability of Resources	Access to PPE	Availability of sterilization equipment	
		Availability of disinfectants	Yes/ No
Training and Education	Formal education on IPC	Formal IPC training received	Yes/ No
		Frequency of IPC training	Likert Scale
Regulatory Oversight	Awareness of IPC regulations	Knowledge of regulatory guidelines	Multiple Choice
		Perception of regulatory effectiveness	Likert Scale
Infection Prevention and Control Practices	Implementation of IPC practices	Hand hygiene compliance	Likert Scale
		Use of PPE	Likert Scale
		Sterilization of instruments	Likert Scale

➤ *Study Design*

This research aims to identify the knowledge, attitudes, and practices of dental surgeons toward infection prevention and control within the selected private dental clinics in the Colombo District, Sri Lanka. The study will employ a quantitative Research method that involves the distribution of a self-administered structured questionnaire at a given time across a specified population to gather numerical data with the view of quantifying variables and correlative caliber. The cross-sectional study design will establish an IPC picture and associated factors of the dental surgeons within the Colombo District in a single and rapid method. Descriptive research will be employed to identify the current state of knowledge, attitude, and practice regarding IPC among dental surgeons. The consideration arises from Kert (2010), Creswell (2014), and Polit & Beck (2017), which express how the quantitative paradigm is crucial for data collection and the trends observed in intervention and policies of the healthcare sector.

➤ *Population*• *Inclusion Criteria*

The study will be conducted only among Sri Lanka Medical Council registered dental surgeons having at least 1 year of experience working in a private dental clinic in the Colombo District. The participants have to be employed in private dental clinics only at present, since the IPC practices may differ in private clinics compared to public healthcare centers due to available tools and the number of patients. This means that subjects have to willingly participate in the study and give their informed consent concerning the research aims and goals.

• *Exclusion Criteria*

Dental surgeons practicing outside the Colombo District, those who do not practice and those who would not portray informed consent will be excluded from the study. This creates geographical uniformity and a particular regional setting; the participants are also up to date with the recent practice in dentistry. The study also excludes those who did not consent or those who refused to be involved in the study, since the research respects ethics and data credibility.

➤ *Study Sample*• *Sampling Method*

Convenient sampling is adopted by this research because it is possible, practical, and easy to implement within the set time frame and resources. In this case, the study methodology is significant since it guarantees enough sample size for the study objectives based on the available and willing participants.

• *Sample Size*

The study will determine the sample size based on the estimated population size and the sampling method used. An estimated population size of around 200 dental surgeons in private clinics in the Colombo District is assumed. The sample size will be approximately 30% (60 Nos) of this population size, which is considered adequate for descriptive studies to achieve reliable results. The sample size will be approached and invited to participate in the study, ensuring a representative sample of dental surgeons practicing in private clinics within the Colombo District. This sample size is expected to provide sufficient data to meet research objectives and ensure a representative sample of dental surgeons practicing in private clinics. When selecting sample dental clinics, samples will be chosen while considering all the municipal councils in the Colombo district. That is equal number of dental clinics will be select from each municipal council in Colombo district.

➤ *Data Collection*

• *Data Collection Method*

Based on the sampling technique and the expected population size, the research will establish the sample size. Approximately 200 dental surgeons working out of private practices in the Colombo District make up the population. To get valid findings from descriptive research, the sample size will be about 30%, or 60 Nos., of the total population. To ensure a representative sample of dental surgeons operating in private clinics within the Colombo District, will approach and invite the sample to participate in the research. In addition to guaranteeing a representative sample of private practice dental surgeons, this sample size is anticipated to provide enough data to fulfill research aims.

• *Data Collection Tool*

The knowledge, attitudes, resources, training, regulatory monitoring, and implementation of IPC practices will be measured in this research via the use of a standardized questionnaire. After conducting a comprehensive literature and instrument evaluation, the questionnaire will be pilot-tested with a subset of dental surgeons to guarantee its validity and reliability. To gauge resource availability and regulatory awareness, the survey will use multiple-choice questions, whereas topics measuring attitudes and behaviors will be measured using Likert scales. Clear instructions and confidentiality guarantees will be provided when the surveys are delivered, whether in person or online, to promote honest replies.

➤ *Data Analysis*

• *Data Analysis Method*

Dental surgeons' demographics and their familiarity with infection control and prevention are summarized using descriptive statistics in this research. Analyses of correlation and regression are examples of inferential statistics that look for connections between different variables. Dental surgeons' infection control and prevention procedures may be better understood with the use of regression analysis, which identifies relevant predictors. The most important variables influencing dental surgeons' adoption of infection prevention and control techniques in private dental clinics may be determined by examining many parameters simultaneously using this approach.

• *Data Analysis Tool(s)*

For this study, will use SPSS, a popular tool for statistical analysis and data management in the social sciences. Researchers of varied statistical competence may benefit from SPSS's intuitive interface for data management, analysis, and interpretation. It also enables the generation of graphic data representations, which is useful for presenting results in papers and research reports.

➤ *Reliability and Validity*

In private dental clinics in Sri Lanka's Colombo District, dental surgeons fill out a questionnaire that this research intends to evaluate for validity and reliability. The internal consistency of the questionnaire will be evaluated using Cronbach's alpha coefficient. A comprehensive evaluation of relevant literature and proven tools, as well as expert assessment, will guarantee content validity. To evaluate the data, will use suitable statistical approaches, including regression analysis, to test hypotheses and identify factors that predict dental surgeons' infection prevention and control procedures. The data analysis will be conducted using SPSS software, which is known for its dependability, capacity to handle huge datasets, adherence to methodological rigor, and transparency in reporting results. To ensure that the questionnaire questions are clear, understandable, and internally consistent, a pilot research will be carried out with a small group of dental surgeons. Social science researchers, especially those studying healthcare practices and habits, generally agree with the technique, which includes self-administered surveys, statistical package SPSS for data processing, and regression analysis. The study's overarching goal is to shed light on what drives dental surgeons' infection prevention and control strategies by providing reliable results.

➤ *Ethical Considerations*

The purpose of this research is to examine some of the moral issues that could arise when using human subjects in scientific studies. Topics covered will include obtaining informed permission, maintaining confidentiality, encouraging voluntary involvement, minimizing harm, obtaining ethical approval, and disclosing the results. The study's goals, methods, confidentiality safeguards, and participants' rights to withdraw at any moment will be communicated to them. Personal information will not be shared or sold and will only be accessible to researchers who have a direct need to know it for data analysis. Everyone involved will be made aware that taking part is completely optional and that they are free to opt-out or stop at any point without any consequences.

Through the use of non-threatening inquiries and maintaining anonymity, we can lessen the likelihood of injury. Institutional review boards or ethics committees will be consulted for ethical permission, and the findings shall be presented in an unbiased and open manner. Transparency and accountability are ensured by informing participants about the general results upon request. This research seeks to protect participants' rights and well-being while shedding light on infection prevention and control practices among dental surgeons in private dental clinics in the Colombo District. To achieve this, it will address these ethical considerations and take appropriate measures to minimize ethical issues.

➤ *Limitations*

In this research, dental surgeons working in private dental clinics in Sri Lanka's Colombo District are examined concerning their procedures for infection prevention and control. Convenience sampling, self-report bias, response rate, time and resource restrictions, and generalizability are some of the study's shortcomings. While self-report bias may lead to inaccurate or socially desired answers, convenient sampling can bring selection bias. The questionnaire will be developed using proven instruments and tested with a small sample to reduce these. Regional differences in healthcare procedures and resources make generalizability questionable. To combat this, shall describe the research population and its circumstances in detail and pick a representative sample of private dental clinics. Although data gathering and analysis may be limited due to time and resource limitations, ensure sufficient planning and allocation. The response rate is another constraint; a low response rate could compromise the statistical power and representativeness of the sample. The goals of the study, the significance of involvement, and the advantages of the research will be communicated using various contact techniques to increase response rates.

CHAPTER FOUR RESULTS

Ninety practicing dental surgeons were invited to participate in the study and 65 had responded to the invitation (response rate 72.2%). There was no statistically significant difference in age and gender of the study participants and non-responders.

Nearly half (49.2%) of the participants belonged to 45-54 age group while 23.1 were from 35-44 group and 21.5% were from 25-34 age group. Nearly two-third (64.6%) of the sample were males and majority of them were having only bachelor's degree as the highest educational qualification. However, significant percentage of participants (16.9 and 15.4 %) had diploma or master's degree in addition to bachelor's degree. Majority (69.2%) of participants were from Colombo Municipal Council (MC) area while 20.0% were from Dehiwala-Mount Lavinia MC area and 10.8% were from Kaduwela MC area. Table 2 describes socio-demographic characteristics of study participants.

Table 2 Socio-Demographic Characteristics of Study Participants (N=65)

Characteristic	Frequency	Percentage
Age		
25-34	14	21.5
35-44	15	23.1
45-54	32	49.2
55 and above	4	6.2
Gender		
Male	42	64.6
Female	23	34.4
Highest Level of Education		
Bachelor's Degree only	38	58.5
Bachelor's +DHDP (Diploma)	11	16.9
Bachelor's +master's degree	10	15.4
Bachelor's +Doctorate	2	3.0
Other	4	6.2
Municipal Council belongs to your dental clinic		
Colombo	45	69.2
Dehiwala-Mount Lavinia	13	20.0
Kaduwela	7	10.8

Most of the participants (57.0%) had practiced private dental practice more than 10 years. Twenty percent of participants had practiced private dental services for 11-15 years while 26.2% had practiced 16-20 years. Interestingly 10.8% had practiced private dental services for more than 21 years. More than a quarter of participants (26.2%) had practiced private dental services for less than 5 years. Table 3 shows duration of dental services by participants.

Table 3 Duration of Private Dental Practice (N=65)

Duration of private practice	Frequency	Percentage
0-5 years	17	26.2
6-10 years	11	16.9
11-15 years	13	20.0
16-20 years	17	26.2
21 years and above	7	10.8

A vast majority (46, 74.2%) of the participants conduct their own private dental clinics while 16, 25.8% practicing as locum basis. The commonest service provision method is to conduct their own single dental clinic (44, 81.5%). Table 4 describes the types of dental clinic services provided by the participants.

Table 4 Type of dental clinic services

Type of clinic	Own clinic	Locum	Total
Single Clinic	44 (81.5)	10 (18.5)	54 (100)
Private Hospital	2 (25.0)	6 (75.0)	8 (100)
Total	46 (74.2)	16 (25.8)	62 (100)

- *Knowledge, Attitude, and Practice*

Knowledge, attitude and practice were assessed through the answers provided for the questions in the questionnaire. Question number 10-19 were allocated to assess knowledge and 20-29 and 30-39 were allocated to assess attitude and practices. One mark was given to each correct response for a question. For questions with responses as Likert scale five marks were given to the correct end and one mark to the other end. Therefore, knowledge section was allocated with 18 marks and attitude and practice section were allocated with 38 and 13 marks respectively.

Mean knowledge score was 11.6 and median was 12.0. Mean attitude score was 31.9 while median was 33.0. Mean practice score was 7.6 and median was 7.0. Table 5 describes means and medians of knowledge, attitude and practice.

Table 5 Means and Medians of Knowledge, Attitude and Practice

Score	Mean (SD)	Median (IQR)
Knowledge	11.6 (3.8)	12.0 (6.0)
Attitude	31.9 (4.4)	33.0 (6.5)
Practice	7.6 (1.9)	7.0 (3.0)

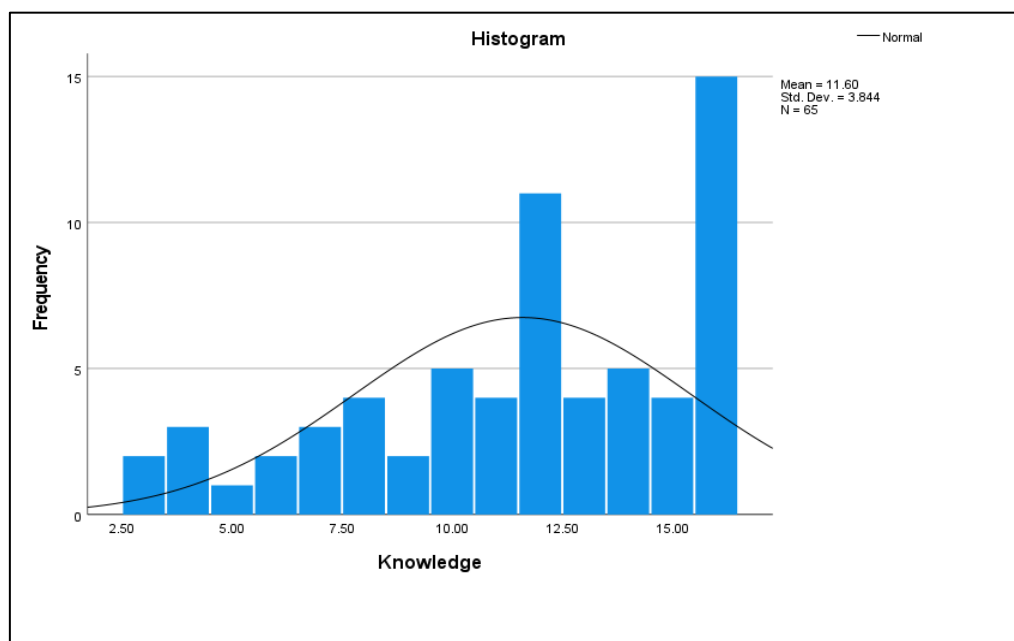


Fig 2 Knowledge

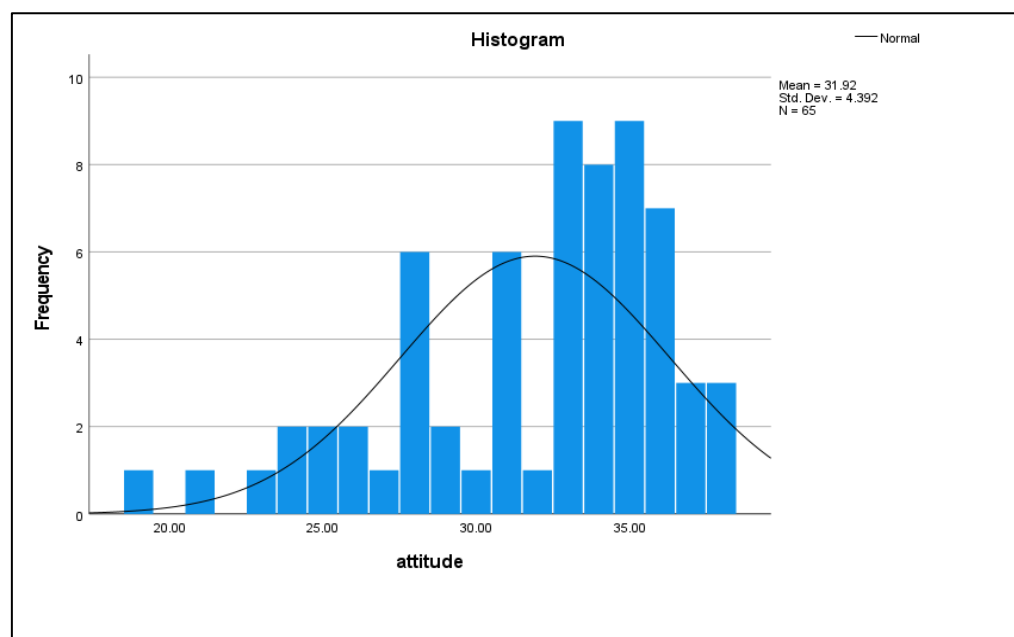


Fig 3 Attitude

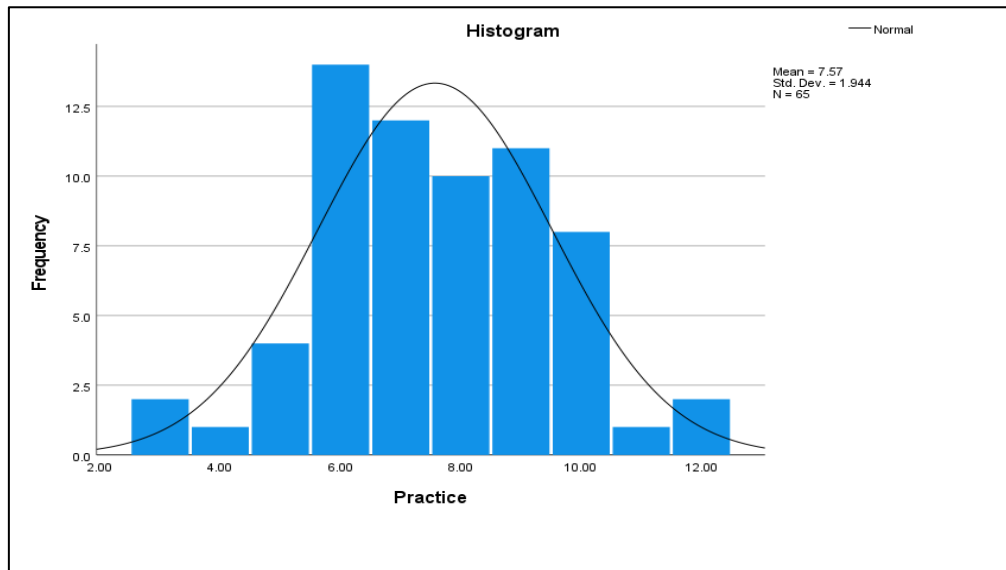


Fig 4 Practice

Negative skewness is obvious in the distribution of knowledge and attitude score. However, skewness is not prominent in distribution of practice score.

Knowledge, attitude and practice scores of median and above were considered as good knowledge, attitude and practice. Sixty percent of participants (39) had good knowledge and attitudes for infection prevention and control. Two third (44, 67.7%) of participants demonstrate good practices towards infection prevention and control. Table 6 and figure 5 describe knowledge, attitude and practices among participants.

Table 6 Knowledge, Attitude and Practices Among Participants

	Good	Poor
Knowledge	39 (60.0)	36 (40.0)
Attitude	39 (60.0)	36 (40.0)
Practice	44 (67.7)	21 (32.3)

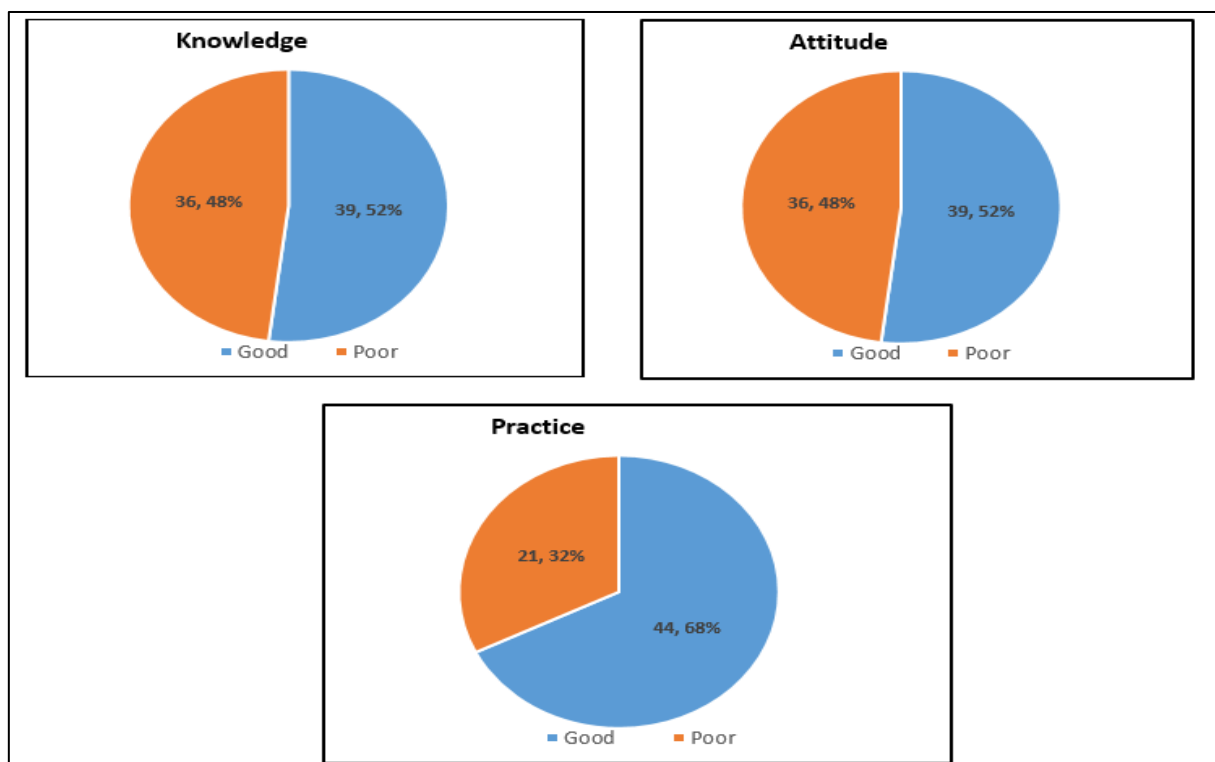


Fig 5 Knowledge, Attitudes and Practices Towards infection Control and Prevention

Better infection control and prevention knowledge was associated with being less than 45 years old, female, and having only a bachelor's degree. However, only age showed a statistically significant association. Though providing services 10 years or less and hospital clinic-based dental services were associated with better knowledge those were not statistically significant. Table 7 shows associations with knowledge.

Table 7 Associations with knowledge

	Knowledge		Total	p-value
	Good (%)	Poor (%)		
Age				
Less than 45 years	22 (75.9)	7 (24.1)	29 (100)	0.02
45 years or more	17 (47.2)	19 (52.8)	36 (100)	
Gender				
Male	24 (57.1)	18 (42.9)	42 (100)	0.53
Female	15 (65.2)	8 (34.8)	23 (100)	
Highest Education achievement				
Bachelor's degree only	24 (63.2)	14 (36.8)	38 (100)	0.54
Had postgraduate education	15 (55.6)	12 (44.4)	27 (100)	
Municipal Council				
Colombo	28 (62.2)	17 (37.8)	45 (100)	0.85
Dehiwala-Mount Lavinia	7 (53.8)	6 (46.2)	13 (100)	
Kaduwela	4 (57.1)	3 (42.9)	7 (100)	
Duration of service				
Up to 10 years	19 (67.9)	9 (32.1)	28 (100)	0.26
More than 10 years	20 (54.1)	17 (45.9)	37 (100)	
Type of service				
Single dental clinic	30 (55.6)	24 (44.4)	54 (100)	0.11
Private hospital clinic	9 (81.8)	2 (18.2)	11 (100)	

Better attitude on infection control and prevention was associated with age less than 45 years, female gender and having postgraduate education. However, none of them showed a statistically significant association. Though providing services 10 years or less and hospital clinic based dental services were showed association with better attitude those were not statistically significant. Table 8 shows associations with attitude.

Table 8 Associations with Attitude

	Attitude		Total	p-value
	Good (%)	Poor (%)		
Age				
Less than 45 years	20 (69.0)	9 (31.0)	29 (100)	0.19
45 years or more	19 (52.8)	17 (47.2)	36 (100)	
Gender				
Male	25 (59.5)	17 (40.5)	42 (100)	0.92
Female	14 (60.9)	9 (39.1)	23 (100)	
Highest Education achievement				
Bachelor's degree only	21 (55.3)	17 (44.7)	38 (100)	0.36
Had postgraduate education	18 (66.7)	9 (33.3)	27 (100)	
Municipal Council				
Colombo	26 (57.8)	19 (42.2)	45 (100)	0.75
Dehiwala-Mount Lavinia	9 (69.2)	4 (30.8)	13 (100)	
Kaduwela	4 (57.1)	3 (42.9)	7 (100)	
Duration of service				
Up to 10 years	20 (71.4)	8 (28.6)	28 (100)	0.10
More than 10 years	19 (51.4)	18 (48.6)	37 (100)	
Type of service				
Single dental clinic	31 (57.4)	23 (42.6)	54 (100)	0.35
Private hospital clinic	8 (72.7)	3 (27.3)	11 (100)	

Better practice on infection control and prevention was associated with age equal to or less than 45 years, female gender and having postgraduate education. However, none of them showed a statistically significant association. Though providing services for

more than 10 years and own clinic-based dental services showed an association with a better attitude those were not statistically significant. Table 9 shows associations with practice

Table 9 Associations with Knowledge

	Practices		Total	p-value
	Good (%)	Poor (%)		
Age				
Less than 45 years	18 (62.1)	11 (37.9)	29 (100)	0.38
45 years or more	26 (72.2)	10 (27.8)	36 (100)	
Gender				
Male	15 (65.2)	8 (34.8)	42 (100)	0.75
Female	29 (69.0)	13 (31.0)	23 (100)	
Highest Education achievement				
Bachelor's degree only	24 (63.2)	14 (36.8)	38 (100)	0.35
Had post graduate education	20 (74.1)	7 (25.9)	27 (100)	
Municipal Council				
Colombo	31 (68.9)	14 (31.1)	45 (100)	0.82
Dehiwala-Mount Lavinia	9 (69.2)	4 (30.8)	13 (100)	
Kaduwela	4 (57.1)	3 (42.9)	7 (100)	
Duration of service				
Up to 10 years	16 (57.1)	12 (42.9)	28 (100)	0.11
More than 10 years	28 (75.7)	9 (24.3)	37 (100)	
Type of service				
Single dental clinic	39 (72.2)	15 (27.8)	54 (100)	0.84
Private hospital clinic	5 (45.5)	6 (54.5)	11 (100)	

CHAPTER FIVE

DISCUSSIONS

➤ *The Current Study was Conducted to Achieve Four Specific Objectives.*

- To evaluate the level of knowledge among dental surgeons in private dental clinics in the Colombo District regarding infection prevention and control measures.
- To analyse the attitudes of dental surgeons in private dental clinics in the Colombo District towards the importance and implementation of infection prevention and control measures.
- To examine the current infection prevention and control practices being implemented by dental surgeons in private dental clinics in the Colombo District.
- To recommend strategies for improving infection prevention and control practices among dental surgeons in private dental clinics in the Colombo District based on the study findings.

The study sample was dental surgeons providing private dental services at private dental clinics. Most of the sample aged more than 45 years. However, there was a reasonable percentage of dental surgeons from the 25 to 35-year age group. Nearly two-thirds of the participants were males, and it is understandable as most of private dental service providers are males. On the other hand, male and female participation in the workforce is 73% and 34% respectively (Department of Census and Statistics 2020). This also supports the gender structure of current study participants. Most participants had a bachelor's degree as their qualification. This was because dental surgeons with higher qualifications tend to be involved with specialised services. A vast majority of participants were from the Colombo Municipal Council area, and it is understandable as it is a highly populated area of the country and most of the health services are in that area. The duration of services was evenly distributed among the sample while a single private clinic being the commonest variety of service provision.

Knowledge on infection prevention and control among the study participants was higher with a mean and median score of 11.6 and 12.0 respectively, while the maximum score could be obtained was 18. On the other hand, 60% of them showed good knowledge (table 4 and 5). However, a systematic review of 15 articles on knowledge, attitudes and practices of ICP showed poor or inadequate knowledge among Iranian dental surgeons (Khanghahi et al. 2013). Further, another Iranian study among public sector dental surgeons also showed inadequate knowledge (Osman Gaffar et al. 2018). In contrast, a study of Pakistani dental surgeons at the private sector showed better knowledge of infection control and prevention (Arif et al. 2019). Knowledge of a particular subject depends on various factors such as initial training, subsequent learning, educational and working environment and demand from the work and clients. Training and working culture might have been different when comparing Iranian and Sri Lankan contexts. However, interestingly knowledge of Pakistani dental surgeons in the private sector was better while public sector dental surgeons' knowledge was inadequate. This might have resulted because of the higher level of expectation among the clients of private dental practitioners. The current study was also conducted among dental surgeons involved in private dental practice. Therefore, good knowledge of ICP in contrast to other studies can be explained by differences in the country contexts and client demand at private dental practices.

Like knowledge poor attitude and practices of ICP were highlighted in several studies (Khanghahi et al. 2013; Mohiuddin and Dawani 2015). Interestingly, some studies have pointed out the incongruity among knowledge, attitudes and practices (Osman Gaffar et al. 2018; Singh et al. 2011). While one study highlights poor knowledge despite positive attitudes and good practices (Osman Gaffar et al. 2018) another showed poor knowledge and practices despite positive attitudes recommending more training and education on ICP (Singh et al. 2011). However, the demonstration of good practices and positive attitudes in current study participants (table 4 and 5) can be explained by differences in the country contexts of education, training, working/learning environment. On the other hand, assessment methods can vary from study to study resulting in contrasting evidence.

The current study highlights that lesser age is associated with better knowledge of IPC and it was statistically significant. Though being a female, having only a bachelor's degree, providing services 10 years or less and hospital clinic-based dental services were shown to be associated, those were not statistically significant (table 6). A study conducted among Japanese dental surgeons highlighted the association between good knowledge and lesser age (Tada, Watanabe, and Senpuku 2014). The same study also highlighted poor compliance with infection control and prevention practices among dental surgeons older than 50 years (Tada et al. 2014). However, the current study does not show a significant association of age with attitudes and practices. Though several studies have highlighted the association of knowledge, attitude and practice with higher work experience and higher education (Bayleyegn et al. 2021; Desta et al. 2018; Gulilat and Tiruneh 2014). The current study failed to establish association of knowledge, attitude and practices with work experience and higher education. On the other hand, several studies have assessed the association of IPC equipment supply with IPC practices and found to be statistically significant (Bayleyegn et al. 2021; Desta et al. 2018; Gulilat and Tiruneh 2014). However, the current study has not assessed characteristics related to healthcare system as the study focus was on private dental practices.

The association between knowledge and gender was pointed out in a study on nursing students where 83.4% were females (Rahiman, Chikte, and Hughes 2018). In contrast, the current study does not show an association of knowledge, attitude or practice with gender. This contrasting evidence can be explained with study sample and sample structure differences. However, the same study highlighted that there is no association of knowledge, attitude or practices with the area of residence (Rahiman et al. 2018). The current study also highlighted the similarity of knowledge, attitude and practice across different areas within the same district. However, it should be noted that areas subjected to comparison were from a similar socio-economic background and it should be interpreted with caution.

Though the current study did not show associations between ICP practices and other factors of interest, several sociodemographic and other factors were found to be associated with ICP practices. In a survey among Taiwanese dental surgeons, female gender, middle age (41 to 50 years) and more source of information were positively associated with good ICP practices (Cheng et al. 2012). Age more than less than 50 years, having specialised in oral surgery, lesser number of patients per day and a better knowledge were associated with better ICP practices among Japanese dental surgeons (Tada et al. 2014). The lack of significant association might have been due to the small sample size and lack of variance in the sample.

Despite the discrepancies with the existing literature, the current study provides valuable insights on ICP and its associations among private dental surgeons. However, such discrepancies might have resulted from contextual, socio-cultural, and educational inputs. Therefore, a cautious interpretation of the study findings provides important insights for healthcare professionals and policymakers to improve ICP among private dental surgeons.

➤ *Strengths and Limitations*

Assessment of the whole spectrum of ICP including knowledge, attitudes and practices, was a major strength of the study. On the other hand, the current study was focused on ICP practices among private dental surgeons which was an under-investigated area. The current study used a self-administered questionnaire to assess the knowledge, attitudes and practices. It facilitated free answering and increased the internal validity of the study. However, there were limitations that could affect the internal and external validity of the study. Small sample size is one such limitation and it resulted in insignificant associations between variables tested. On the other hand, small sample size can also lead to reduced external validity of the study and hence generalisability of results is affected. The current study selected dental surgeons from highly urban area, and it does not represent the population of dental surgeons in the country.

CHAPTER SIX

CONCLUSIONS AND RECOMMENDATIONS

Knowledge, attitudes and practices on ICP were good among selected dental surgeons. A significant lower level of knowledge noted among older dental surgeons. We recommend further studies on this important area with larger sample to represent the country's context.

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