Fallacy of Covid-19 Vaccine Coverage: Discovering Vaccine Hesitancy and Compliance in Private Dental Practitioners and Hospital-based Dentists to Improve Immunization Levels in Pakistan

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ABSTRACT

Objective: To evaluate Covid-19 vaccine compliance amongst the general private practicing dentists' population in comparison to tertiary hospital-based dentists in Pakistan post second wave of mass spread of the Covid-19 infection.

Methodology: Multi-centered study conducted after taking ethical research committee approval. Total 300 participants enrolled via paper-based questionnaire. Participants included the general dentists and tertiary care dental hospital-based dentists. Exclusion criteria implied participants of pilot study, participants that were already vaccinated and those unwilling to participate in the study.

Results: 32% of general dentists in Pakistan agreed to immunization if the Covid-19 vaccine is available in Pakistan ($p < 0.001$). General private practicing dentists were also less likely to pay for the vaccination ($p < 0.001$), less confident for a locally manufactured vaccine ($p < 0.001$) as compared to hospital-based dentists.

Conclusion: This study concluded that the general dentists' population in Pakistan is still skeptical of Covid-19 vaccination and this attitude in-fact poses as a pandemic within pandemic.

Keywords: Covid-19 vaccine hesitancy, public health dentistry.

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I. INTRODUCTION

Covid-19 is a global pandemic having had -to date a devastating impact on humanity raising serious public health concerns. The World Health Organization (WHO) has been relentless towards devising protocols and preventive strategies for early diagnosis, prompt treatment, and curtailment of transmission of this highly infective disease which include development of an effective vaccine against the disease, to mitigate future transmissions.

Given that oral health is integral to general health and well-being and the dynamic nature of relationship between the two, dental public health was also greatly affected and resulted in too thought-provoking discussions in the literature on reducing adverse outcomes through better preparedness against the disease [1].

The weeks following announcement of Covid-19 lockdown during the first two mass outbreaks of the disease in Pakistan saw public health plans to avoid another wave. Throughout the pandemic, owing to the close contact with patients and production of aerosols during procedures, the focus of dental services has remained patient safety, globally [2].

However, strict adherence to new approaches such as remote consultations, triage and others meant dental operations to be restricted to emergencies only. Firm adherence to universal precautions and modifications in dental practices, limited provisions of dental services meant sub-optimal treatments, cessation of routine dental checkups, prioritized distributions of personal protective equipment's, reduced government support to private dental practices altered quality of care provided. The economic impact of Covid-19 made private practices more vulnerable with increased costs and limited supply of materials including PPEs, reduced patient turnover, and a high risk of contracting the infection during a procedure. This resulted in closure of many private general dental practices which amplified this vicious cycle of Covid-19 adversities, both nationally and internationally [3].

To address these challenges of Covid-19, developing herd immunity at the population level with mass immunizations has become the highest priority both nationally and internationally [4]. The compliance, however, to this campaign has been inconsistent due to several concerns like safety, efficacy, cost-effectiveness, and long-term adverse effects [4].

Vaccine hesitancy is defined as behavior with refusal or delay in acceptance of vaccine despite the availability of vaccine. Individuals do not perceive the need for vaccine due to underestimation of disease severity and lack of accessibility at the community level [5], [6] in 2019, WHO deemed vaccine hesitancy as one of the ten major challenges to achieving global health [7].

Poor compliance and vaccine hesitancy can be attributed to skepticism about vaccine efficacy as reported by Peretti *et al.* [8] that 26% of the general population of France resisted immunization against SARS-COV-2 even with the availability of a vaccine. Similarly, a research work by Kabamba Nzaji *et al.* [9] showed alarmingly high vaccine hesitancy levels in health care professionals and only a 27.7% acceptance rate.

The aim of this study was to assess Covid-19 vaccination compliance in relation to a comparison of vaccine acceptance and hesitancy amongst private general dentistry practitioners and hospital-based dentists following the first two waves of mass Covid-19 in Pakistan. The dental profession in Pakistan reflects on attitudes, perceptions, and practices of other subsets of the healthcare profession. Therefore, this cross-sectional survey would identify the areas of high vaccine hesitancy in Pakistan highlighting the general sentiment of healthcare professionals towards Covid-19 vaccine and a need for a robust scheme of plan including educational campaigns to alleviate apprehensions and hesitancy towards immunization against Covid-19.

II. METHODOLOGY

Multi-centered study conducted after taking approval from the ethical research committee.

The sample size calculation for this prospective cross-sectional analytical study was done using Open epi. Calculator. With 95% confidence level, margin of error 5% where the hypothesized frequency of acceptance related to coronavirus vaccine acceptance among the general population was 75% $\pm$ 5 as reported Dror *et al.* [10]. The final sample size required for this study was 370.

A non-probability consecutive sampling methodology was employed and a total of 300 participants after voluntary consent were enrolled in the study.

The sample constituted of general dentists (private practitioners) and tertiary care dentists (hospital-based). Exclusion criteria implied participants of the pilot study, those unwilling to participate and all those who were already vaccinated.

The pre-validated. Reliable Questionnaire adapted from relevant studies was used. It was piloted on a population of medical practitioners.

The final questionnaire comprised of two sections in addition to the demographic and professional profile. Section – I included six structured multiple-choice questions (close-ended) with a variable number of stems, addressed inquiries about Comorbid (hypertension, diabetes, asthma, cardiovascular diseases, etc.), Covid-19 ailment experience among family members, friends, neighbor's, colleagues, eagerness If a vaccine against Covid-19 was available, willingness to pay for the Covid-19 vaccine, and accept Covid-19 vaccine if employer recommended it. Confidence

on Domestically Manufactured or Foreign Manufactured Vaccine. and Section – II included nine questions based on the Likert Scale, addressed concerns against vaccination such as quality control, skepticism about side effects, wait further to ensure credibility of vaccination maybe until next year. Pregnancy to be the reason for reluctance. Doubts about vaccination efficacy or belief in physiological immunity are better. Frequency of seasonal flu vaccination was also inquired. Confidentiality and anonymity of the data collected was upheld during the entire course of the research study.

III. RESULTS

A total of 300 participants responded to the self-administered questionnaire provided for this study, response rate 81%. The study sample comprised of 150 general dentists (private-practice) with a valid license to practice from the PMC working in Rawalpindi/Islamabad and a 150 hospital based tertiary care dentists with a valid License from Pakistan Medical Commission working in Rawalpindi/ Islamabad.

The demographic characteristics of the study population are summarized in Table I. About 10.3% of all participants, either, themselves or their family members had experienced Covid-19 during the first two waves, 14.7% had their friends recover from Covid-19 infection in either of the first two waves, while neighbors and colleagues of 18% and 38.7% participants were infected with Covid-19 infection during the first two waves.

In terms of vaccine acceptance, 148 (49.3%) participants agreed that they will get vaccinated if the Covid-19 vaccine will become available for use in Pakistan. Participants belonging to age group 35-44 years were most likely to accept Covid-19 vaccination ($p<0.001$), similarly, post-graduation level of education was significantly associated with Covid-19 vaccine acceptance ($p=0.006$) as shown in Fig. 1. Absence of comorbidities in the study sample further supported vaccine acceptance ($p=0.001$) as presented in Fig. 2.

Group comparison revealed that the general dentist population was significantly less willing to get Covid-19 vaccine ($p<0.001$), less likely to pay for the vaccination ($p<0.001$), less confident for the locally manufactured vaccine ($p<0.001$) as compared to hospital-based dentists as shown in Table II. Tertiary care hospital-based dentists were most receptive towards accepting a Covid-19 vaccination ($p<0.001$), Table II.

Similarly, the general dentists, practicing privately, were skeptical regarding quality control of vaccines ($p<0.001$), side effects ($p<0.001$), and wished to delay immunization ($p<0.001$), since they were doubtful of vaccine efficacy ($p=0.015$) and more inclined towards the notion that physiological immunity is better than artificial one ($p<0.001$) as compared to hospital based tertiary dentists as summarized in Table III.

Fig. 1. Acceptance and Avoidance of Covid-19 vaccine among general dentists (private practice based) and Hospital based tertiary care dentists.

Fig. 2. Acceptance of Covid-19 vaccine concerning the presence of comorbidities.

TABLE I: DEMOGRAPHIC CHARACTERISTICS OF THE STUDY POPULATION, TOTAL N=300

Demographic Variables	General Dentists (private practice) n=150	Tertiary care Dentists (Hospital-based) n=150
Gender		
• Male	52 (34.6%)	42 (28.0%)
• Female	98 (65.3%)	108 (72.0%)
Age groups		
• 18-24 years	28 (18.7%)	0 (0%)
• 25-34 years	85 (65.9%)	44 (29.3%)
• 35-44 years	29 (19.3%)	87 (58.0%)
• 45-55 years	5 (3.3%)	19 (12.7%)
• 55-65 years	3 (2.0%)	0 (0%)
Marital Status		
• Single	78 (52.0%)	45 (30.0%)
• Married	72 (48.0%)	105 (70.0%)
Level of education		
• Graduation	85 (56.7%)	66 (44.0%)
• Post-graduation	65 (43.3%)	84 (56.0%)
Occupation		
• General Dentists	150 (100%)	0 (0%)
• Hospital-based resident dentists	0 (0%)	62 (41.3%)
• Hospital-based consultants	0 (0%)	48 (32.0%)
• Hospital based teaching faculty	0 (0%)	40 (26.7%)
Comorbidities		
• Hypertension	16 (10.7%)	2 (1.3%)
• Diabetes	19 (12.7%)	9 (6.0%)
• Asthma	20 (13.3%)	3 (2.0%)
Covid-19 experience		
• Self/Family	17 (11.3%)	14 (9.3%)
• Relative/Friends	27 (18.0%)	17 (11.3%)
• Neighbours	25 (16.7%)	29 (19.3%)
• Colleagues	45 (30.0%)	71 (47.3%)

TABLE II: ACCEPTANCE OF COVID-19 VACCINATION AMONG STUDY GROUPS (N=300)

Acceptance	General Dentists (private practice) n=150	Tertiary care Dentists (Hospital-based) n=150	P-value
If Covid-19 vaccine is available, would you take it?			
• Yes	48 (32.0%)	102 (68.0%)	<0.001
• No	102 (68.0%)	48 (32.0%)	
Are you willing TO pay for the COVID-19 vaccine?			
• Yes	11 (7.3%)	68 (45.3%)	<0.001
• No	139 (92.7%)	82 (54.7%)	
Accept Covid-19 vaccine if the employer recommended it:			
• Yes	53 (35.3%)	130 (86.7%)	<0.001
• No	97 (64.7%)	20 (13.3%)	
Are you confident about the locally-manufactured vaccine?			
• Yes	55 (36.7%)	85 (56.7%)	0.001
• No	95 (63.3%)	65 (43.3%)	
Are you confident about the internationally manufactured vaccine?			
• Yes	80 (53.3%)	119 (79.3%)	<0.0001
• No	70 (46.7%)	31 (20.7%)	

TABLE III: SUMMARY OF CONCERNS REGARDING COVID-19 AMONG STUDY GROUPS (N=300)

Concerns	General Dentists (private practice) n=150	Tertiary care Dentists (Hospital- based) n=150	P-value
Are you worried about quality control?			
• Yes	101 (67.3%)	46 (30.7%)	<0.001
• No	49 (32.7%)	104 (69.3%)	
Are you skeptical about the side effects?			
• Yes	113 (75.3%)	84 (56.0%)	<0.001
• No	37 (24.7%)	66 (44.0%)	
Would you like to wait until the vaccine is time tested?			
• Yes	121 (80.7%)	100 (66.7%)	0.006
• No	29 (19.3%)	50 (33.3%)	
Would you like to wait for next year to get vaccinated?			
• Yes	81 (54.0%)	64 (42.7%)	0.050
• No	69 (46.0%)	86 (57.3%)	
Are pregnancies increasing your hesitancy towards vaccines?			
• Yes	13 (8.7%)	0 (0%)	<0.001
• No	137 (91.3%)	150 (100%)	
Do you have doubts regarding the efficacy of the vaccine?			
• Yes	128 (85.3%)	111 (74.0%)	0.015
• No	22 (14.7%)	39 (26.0%)	
You are hesitant to get vaccinated because you think Covid-19 symptoms are mostly mild?			
• Yes	67 (44.7%)	78 (52.0%)	0.204
• No	83 (55.3%)	72 (48.0%)	
In your opinion, physiological immunity is better than getting vaccinated?			
• Yes	87 (58.0%)	18 (12.0%)	<0.001
• No	63 (42.0%)	132 (88.0%)	
Do you get seasonal influenza shots?			
• Yes	14 (9.3%)	13 (8.7%)	0.840
• No	136 (90.7%)	137 (91.3%)	

IV. DISCUSSION

With the Covid-19 pandemic, perilous economic, social, and humanitarian times dawned upon healthcare professionals including dental professionals globally [11]. In the second wave a marked rise in Covid-19 positive patients including healthcare and dental care workers was experienced both globally and nationally, which suggested unexpectedly rapid transmission of the disease. This progression, distribution and spread of the disease was explored greatly in tandem with focused efforts towards development of a vaccine against SARS-COV-2. With global actions in accordance with WHO guidelines to control the spread of the disease sufficient time was gained for vaccines to be developed against this highly infectious disease [12].

At present, immunization of health care workers including dental professionals is a national priority. Vaccine compliance, high coverage and uptake is pivotal for protection and immunization against this highly infectious disease. None the less, this essential endeavor is hindered by an over-all global hesitancy towards receiving vaccination [11] as evident from international un-satisfaction levels of Covid-19 vaccination. In developed countries such as the United States of America, a survey of the general population concluded that only 50% of the entire American Population was willing to opt for immunization against this monstrosity [13]. A similar survey in Europe showed an acceptance rate of only 70% [14].

The dental profession as practiced in Pakistan is quite

unique. The dental care workers span from private practitioners of general dentistry to hospital based specialized tertiary dental care providers. During the Covid-19 pandemic, both globally and nationally, dental procedures ceased to essential operations only. The resultant being social, economic, professional, and personal anxieties amongst dentists rocketing sky high [15]. The higher risk of contracting Covid-19 infection in a dental surgery owing to the use of aerosols and proximity with the patients resulted in practice modifications, staggered practice timings, reduced patient flow, economic hardships and all this took a significant psycho-social toll on private general dentists [16]-[18]. Hospital based dentists on the other hand were better equipped and continued to work with universal precautions during the intense first two Covid-19 waves pre vaccine development [19].

A general lack of awareness, knowledge and attitudes towards the spread and transmission of the disease as observed in Saudi Arabia and others highlighted meagre levels of preparedness and perceptions towards combatting and protecting against Covid-19 [20]. This lack of knowledge and understanding, safety profile, and confidence in immunization against Covid-19 and the recently developed vaccines are considered prime factors towards hesitancy and non- acceptance [21], [22]. Although, vaccines for many infectious diseases have over time proven to be cost-effective and equally efficacious, yet in some parts of the world, are still seen as a conspiracy and received with hostility by the population [23].

To our knowledge, this is the first study assessing and comparing perceptions and attitudes of dental professionals, general private practice practitioners and specialized tertiary care dentists based in hospital settings in Pakistan. From this study certain similarities and several differences to studies conducted in developed countries are apparent.

A longitudinal study conducted in Australia reported 59% of the study population eager for Covid-19 immunization [24]. An overall acceptance of 50% all dentists in our study corresponds to the above stated findings. Hence it can be concluded that a universal shared belief of acceptance to Covid-19 immunization exists amongst dentists.

In this study the occupational role of the dentists was essential in vaccine hesitancy. General dental private practitioners were economically hard hit during the first two Covid-19 waves in Pakistan which resulted in lower patient turnouts, economic collapses and general closing down of many practices. On the contrary hospital-based dentists survived the economic crisis associated with Covid-19 owing to better funding (both national, international: governmental and non-governmental) and research-based resources of tertiary care dental hospitals. This economic level as dictated by occupation is significant in vaccine hesitancy displayed by the general dental practitioners. A similar trend has been observed in Italy has been reported by Bertonecello *et.al* [25].

The study demographics show that the study populations of both general private dental practitioners and hospital-based dentists had a majority of females. This trend corroborates with the profound trend of “feminization of the dental profession” in low-middle income countries [26]. Synonymous to the findings of the review by Sallam [27], female dentists were found to be more hesitant to the covid-19 vaccination in comparison to their male counterparts.

Since Pakistan is still vulnerable to conspiracy narratives such as those accounting for failure of polio immunization, Covid-19 vaccine following its introduction was also received with numerous collusion narratives and myths. With these theories being projected by public figures on media platforms, penetrating deep into all tiers of the Pakistani society, vaccine hesitancy has become one of the greatest challenges to tackling Covid-19.

The Government although stepped in by accelerating its immunization against Covid-19 campaign is yet to take a hardline approach against misleading, misinformation regarding protocols, costs, reported signs and symptoms after vaccination. Despite initiating immunization campaigns little efforts on education of dental healthcare workers has been conducted by the concerned public health authorities. It can be suggested here that increased representation of public health dentists can contribute greatly to advocating for Covid-19 vaccine amongst dental healthcare workers. A positive contributing role of media and media regulating authorities can greatly contribute to improved vaccine adherence [28].

In the present, however, Pakistani dentists are generally still stuck in catch 22 owing to failure of advocacy, spread of mass public education and awareness and adherence to preventive strategies such as immunization against Covid-19.

V. CONCLUSION

This study concluded that the general private practicing dentists in Pakistan are still skeptical about the Covid-19 vaccination. This attitude is indeed a pandemic within pandemic.

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