

Health and Immune Boosting Techniques of General Adult Pakistani Population: A KAP Study

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Abstract

Objective: To discover Pakistani adult population's perception about their general health, immune status and knowledge regarding immunity, and to highlight their efforts to improve it.

Method: The knowledge-attitude-practice study was conducted from January to May 2021, after approval ethics review committee of the Islamic International Medical College, Rawalpindi, Pakistan, and comprised individuals of either gender from the community aged 18 years or more and not suffering from any physical disability or mental illness. Data was collected using a pre-tested, self-administered questionnaire that was disseminated through online platforms. The collected data was analysed using SPSS 25.

Results: All the 455(100%) individuals approached responded to the questionnaire. The mean age of the subjects was 22.6 ± 7.579 years. There were 256(56.3%) female respondents, 283(62.2%) were aged 20-21 years, and 359(78.9%) hailed from the Sindh province. Most participants perceived their general health as 'good' 197(43.3%). The immune system function was reported 'good' by 200(44%), and the perception of general knowledge of immunity was reported 'good' by 189(41.5%) subjects. Inverse relationships were identified between stress levels and self-perceived health, and between receiving effective homeopathic treatment and 'very good' self-perceived immune status ($p < 0.05$). People willing to take non-obligatory vaccines had a positive opinion about their self-perceived knowledge on immunity that produced a direct relationship ($p < 0.05$).

Conclusion: The findings provide a framework of practices that should be promoted to improve health status of adult population in Pakistan.

Keywords: Health status, Immunity, Attitude to health, Healthy lifestyle, Knowledge, Practices.

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Introduction

According to the World Health Organisation (WHO), Pakistan for some time has been experiencing a 'double burden',¹ which means diseases correlated with underdevelopment are out of control and risk factors correlated with development are remarkable. Extreme poverty along with the increase in population, low literacy rate, low healthcare budget, inadequate healthcare facilities, and lack of skilled and well-trained professionals in the health field have further worsened the situation.² It is because of this increasing burden on the health system that there is a constant need to improve the general immune status of the population as adult vaccination coverage in Pakistan is low.³ Since the immune system is our host defence system against foreign substances, cells or tissues, it is our alarming need for it to work efficiently.⁴

For many years, the advancements and discoveries of immunologists all over the world, aided by microbiologists,

have helped us understand mechanisms used by the evolving immune system to protect the body from itself altering pathogenic microorganisms.⁵ This has enabled health professionals to monitor and manage immune responses. The knowledge obtained has helped them come forward with tested and approved practices that can help boost the immunity of the general population and ultimately improve patient outcomes.⁶ These vary from measures taken by professionals, for example, vaccines being made available that are obligatory at childbirth or that can be administered at other stages of life, to measures taken by people themselves, which include modifying their lifestyle to a healthier one.^{7,8} With this information being made available, it is important to evaluate the knowledge, attitude and practice (KAP) of the population in Pakistan.

Such a study will help identify the popularity of practices other than those supported by scientific literature, hence pointing out myths as well.^{9,10} Moreover, since the ongoing coronavirus disease-2019 (COVID-19) pandemic has brought drastic changes in behaviours and concerns of the people, such a study would highlight if the change in attitude towards boosting one's immunity was due to the pandemic.¹¹ Such findings can help healthcare experts

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analyse the lack of perceived knowledge and efforts and also aid in counselling their patients regarding health status and immunity while combating negative physiological factors, like stress and eliminating practices, which might potentially have more harmful effects than beneficial ones.¹² As there are not enough updated health policies targeting the immune-strengthening aspect, such findings on the degree of awareness amongst the populace will help in filling these gaps by highlighting popular practices and providing opportunities for researchers to further study and encourage the beneficial ones while discouraging one causing harm, thus helping in creating appropriate health policies.¹³

The current study was planned to highlight the general adult population of Pakistan's perceived health, immune status and immune knowledge, and to focus on the effect of avoiding certain factors and adapting some immune-boosting techniques.

Subjects and Methods

The KAP study was conducted from January 2021 to May 2021, after approval from the ethics review committee of the Islamic International Medical College, Rawalpindi, Pakistan. An online self-administered questionnaire was prepared on Google Forms in English and was distributed on different platforms, such as WhatsApp and Facebook, to be filled by consenting individuals aged 18 years or more and not suffering from any form of physical disability or mental illness. To remove any bias, the Google Form submission was made anonymous, and duplicate responses were avoided by only allowing them access through their email identities (IDs). Experts in the field were contacted by the investigators to approve the development of the questionnaire, using previously validated questionnaires from similar studies.¹⁴⁻¹⁶ The questionnaire was pilot-tested using 16 random participants to make sure it was relevant and clear, and these responses were not included in the final analysis. To test the reliability of the scales, Cronbach's Alpha analysis was done. A value of 0.628 was obtained where any value >0.6 is considered acceptable.

The questionnaire consisted of two sections; demographics, and various aspects of the general awareness and practices. The first section included basic questions about age, gender, and where the respondent was from. The second section had multiple-choice questions (MCQs), with options converted into scores, such as a-e to 0-4, respectively. A 5-point Likert scale question, ranging from very bad=0 to very good=4, was also added, assessing their perceived health, immunity status and knowledge regarding immunity. There was also a linear

scale with 1-5 rating, 1 being the least and 5 being the most, inquiring to what extent, according to them, recent events of COVID-19 affected their knowledge and practices related to immunity boost.

The sample size was estimated using Raosoft calculator with 95% confidence level and 5% margin of error.¹⁷ It was inflated by 18%.

The collected data was analysed using SPSS 25. Quantitative variables were expressed as mean and standard deviation (SD), whereas frequencies and percentages were used for qualitative variables. Chi-square test was used to find significant relationships. Confidence interval (CI) was set at 95% and $p < 0.05$ indicated a significant relationship. P-value from Likelihood Ratio was used where the assumptions for the chi-square test were violated. Multinomial logistic regression analysis was performed for significant variables where possible. For regression also, 95% CI was used and $p < 0.05$ was considered significant.

Results

All the 455(100%) individuals approached responded to the questionnaire. The mean age of the subjects was 22.6 ± 7.579 years. There were 256(56.3%) female respondents, 283(62.2%) were aged 20-21 years, and 359(78.9%) hailed from the Sindh province. Most participants perceived their general health as 'good' 197(43.3%). The immune system function was reported 'good' by 200(44%), and the perception of general knowledge of immunity was reported 'good' by 189(41.5%) subjects.

Significant relationships existed between the perception of people's general health and some factors, like stress levels and frequency of their physical activity (days per week) (Table-1). Time the participants spent doing physical activity on a particular day ($p=0.003$) was also notable. Other practices with significant associations were consumption of milk ($p=0.008$) and vegetables/fruits ($p=0.004$), along with how often they take vitamins/minerals ($p=0.016$), and when they take steroidal medications/supplements ($p=0.011$). There was also a significant link found between self-described health status and belief in an herbal approach for immunity ($p=0.041$). Self-claimed change in the population's knowledge and practices towards immunity after the COVID-19 pandemic ($p=0.047$) was found to be significant towards their perception of general health. Experiencing health problems, like fever ($p=0.004$), diarrhoea ($p=0.030$), headache ($p=0.001$), skin problems ($p < 0.001$), and muscle and joint pain ($p < 0.001$), in the preceding 12 months was also significantly associated. There was no association found with sleep duration ($p=0.156$).

Table-1: Association of frequency of physical activity and levels of stress with perceived general health (n=455).

How many days a week do you perform any physical activity/exercise? (e.g. walking, heavy lifting, cycling etc.)	I don't exercise (n=81) n (%)	Irregular (n=133) n (%)	1-2 days (n=58) n (%)	3-4 days (n=86) n (%)	5-6 days (n=43) n (%)	Everyday (n=54) n (%)	p-value
Total (in %)	17.8%	29.2%	12.7%	18.9%	9.5%	11.9%	<0.001*
General health rating							
Very Bad	5 (55.6)	2 (22.2)	1 (11.1)	0 (0.0)	0 (0.0)	54 (11.1)	
Bad	12 (35.3)	9 (26.5)	6 (17.6)	1 (2.9)	3 (8.8)	3 (8.8)	
Average	31 (18.8)	61 (37.0)	22 (13.3)	25 (15.2)	13 (7.9)	13 (7.9)	
Good	29 (14.7)	46 (23.4)	22 (11.2)	55 (27.9)	24 (12.2)	21 (10.7)	
Very Good	4 (8.0)	15 (30.0)	7 (14.0)	5 (10.0)	3 (6.0)	16 (32.0)	
According to you, what is your stress level?	Low (n=79)	Moderate (n=254)		High (n=122)		p-value	
Total in %	17.4%	55.8%		61.9%		<0.001	
General health rating							
Very Bad	2 (22.2)	2 (22.2)		5 (55.6)			
Bad	3 (8.8)	13 (38.2)		18 (52.9)			
Average	13 (7.9)	91 (55.2)		61 (37.0)			
Good	41 (20.8)	122 (61.9)		34 (17.3)			
Very Good	20 (40.0)	26 (52.0)		4 (8.0)			

Table-2: Association of vegetables/fruits consumption and receiving effective homeopathic treatment with perceived immune system rating (n=455).

Select the following based on your average consumption of each: [Vegetables/Fruits]	Never (n=13) n (%)	Irregularly (n=175) n (%)	Daily (n=234) n (%)	More than once a day (n=33) n (%)	p-value
Total in %	2.9%	38.5%	51.4%	7.3%	<0.001*
Immune System rating					
Very Bad	3 (50.0)	3 (50.0)	0 (0.0)	0 (0.0)	
Bad	1 (4.8)	9 (42.9)	10 (47.6)	1 (4.8)	
Average	5 (3.2)	71 (45.5)	69 (44.2)	11 (7.1)	
Good	4 (2.0)	69 (34.5)	116 (58.0)	11 (5.5)	
Very Good	0 (0.0)	23 (31.9)	39 (54.2)	10 (13.9)	
Have you ever used homeopathic treatment that was effective?	Yes (n=193)	No (n=262)		p-value	
Total in %	42.4%	57.6%		0.023	
Immune System rating					
Very Bad	5 (83.3)	1 (16.7)			
Bad	12 (57.1)	9 (42.9)			
Average	67 (42.9)	89 (57.1)			
Good	88 (44.0)	112 (56.0)			
Very Good	21 (29.2)	51 (70.8)			

Significant link existed between perceived immunocompetence and vegetables/fruits consumption, in addition to receiving effective homeopathic treatment (Table-2). Perception of immune function was also found to be significantly linked with gender ($p=0.045$). Participant's habits, like daily average consumption of water ($p=0.022$) and meat/fish ($p=0.002$), as well as their stress levels ($p<0.001$) and their reasons to quit smoking during the preceding 12 months ($p=0.020$) were the other associations. Experiencing fever ($p<0.001$), headache ($p=0.007$), skin problems ($p<0.001$) and muscle and joint pain ($p=0.001$) in the preceding 12 months also had a significant association with it, along with hours they spent

doing physical activity in a day ($p=0.020$). The willingness to take non-obligatory vaccines ($p=0.202$) had non-significant association with self-assessed immune status ($p>0.05$).

Perceived knowledge about general immunity had a significant relationship with making efforts to learn about emerging health concerns and also participants' willingness to take non-obligatory vaccines (Table-3). Association was also present with the province the participants belonged to ($p=0.033$). Other associated factors were dietary patterns which included intake of milk ($p<0.001$), meat/fish ($p=0.001$) and vegetables/fruits ($p<0.001$). Receiving effective homeopathic treatment ($p=0.013$) and a belief ($p<0.001$) that it improves immunity was significant as well. Completing antibiotic courses ($p<0.001$), and the condition in which they take over-the-counter (OTC) drugs ($p=0.050$) and steroidal medications ($p=0.043$) were also significant variables. Health complaints of headache ($p=0.029$), skin problems ($p=0.017$), and muscle and joint pain ($p=0.001$) had a connection with people's self-assessed knowledge about immunity.

Multinomial regression analysis revealed an inverse relationship between stress levels and perceived health, as 'very good' perceived health was associated with low stress ($B=3.16$, $p=0.00$, odds ratio [OR] = 80.20). It also showed that people who received effective homeopathic treatment were less likely to consider their immune system

Table-3: Association of non-obligatory vaccines' acceptance, learning about emerging health concerns and COVID-19 with perceived general knowledge regarding immunity rating (n=455).

Will you take those vaccines which are NOT obligatory according to the government health care policies?		Yes (n=180)	No (n=275)	p-value		
Total in %		39.6%	60.4%	0.022		
General knowledge regarding immunity rating						
Very Bad		3 (50.0)	3 (50.0)			
Bad		10 (30.3)	23 (69.7)			
Average		55 (31.4)	120 (68.6)			
Good		86 (45.5)	103 (54.5)			
Very Good		26 (50.0)	26 (50.0)			
When do you learn about emerging health concerns?	Most of time, even when I am not at risk (n=254)	Only if I am at risk (n=144)	I make no effort (n=57)	p-value		
Total in %	55.8%	0 (0.0)	5 (83.3%)	<0.001*		
General knowledge regarding immunity rating						
Very Bad		18 (9.5)	4 (12.1%)			
Bad		72 (41.1)	29 (16.6%)			
Average		49 (25.9)	18 (54.5%)			
Good		5 (9.6)	1 (1.9%)			
Very Good		0 (0.0)	5 (83.3%)			
		18 (9.5)	4 (12.1%)			
To what extent did the recent events of COVID-19 affect your knowledge and practices to boost your immunity	1 (n=19)	2 (n=44)	3 (n=170)	4 (n=144)	5 (n=78)	p-value
Total in %	4.2%	9.7%	37.4%	31.6%	17.1%	0.001*
General knowledge regarding immunity rating						
Very Bad		1 (16.7)	3 (50.0)	1 (16.7)	0 (0.0)	1 (16.7)
Bad		1 (3.0)	8 (24.2)	15 (45.5)	4 (12.1)	5 (15.2)
Average		8 (4.6)	16 (9.1)	71 (40.6)	59 (33.7)	21 (12.0)
Good		9 (4.8)	14 (7.4)	68 (36.0)	63 (33.3)	35 (18.5)
Very Good		0 (0.0)	3 (5.8)	15 (28.8)	18 (34.6)	16 (30.8)

*Likelihood Ratio Asymptotic Significance was used instead of the Pearson Chi-Square Asymptotic Significance as the expected count was >20%; COVID-19: Coronavirus disease-2019.

functioning as 'very good' ($B=-0.60$, $p=0.05$, $OR=0.55$). People willing to take non-obligatory vaccines generally had high opinion about their knowledge of general immunity, considering it to be 'good' ($B=0.60$, $p=0.01$, $OR=0.55$) and 'very good' ($B=0.78$, $p=0.02$, $OR=2.18$).

Discussion

The current study highlighted the awareness and practices of Pakistanis regarding improvement of general health and immunity, showing that most subjects self-rated their health, immune status, and knowledge of general immunity as either 'average' or 'good'. These ratings were significantly associated with a multitude of immune-boosting practices and factors.

Research has shown that exercise positively affects the perception of health status in people.¹⁸ The current study also highlighted a significant relationship between exercise frequency and self-rated general health.

The current study showed that the more stress a person takes, the more unwell they may feel. A study done in 2016 reported similar results.¹⁹

The current study suggested that a significant relationship exists between fruit/vegetable consumption and perceived

immune status. This suggestion is supported by a meta-analysis done in 2018.²⁰

Homeopathic medication is a popular practice among the people.²¹ The current study found a negative significant relationship between effectively using it and 'very good' perceived immunity. It was found that 36% people believed in a homeopathic approach for immunity and 42.4% of people believed that they had received effective homeopathic treatment at some point in their lives. In contrast, a 2020 study in India suggested that only 21.3% of people who took homeopathic prophylaxis for COVID-19 felt completely protected and that 7.7% people believed that homeopathy was somewhat effective.²¹

According to the current findings, there was a positive association between the acceptance of non-obligatory vaccines and perceived knowledge about general immunity. Only 39.6% people were willing to take non-obligatory vaccines. This is much less than the 73% reported by a study asking mothers whether they will give their children the flu shot, which is a non-obligatory vaccine.²² However, the earlier study only comprised healthcare workers in one paediatric hospital.²²

The current study found a significant relationship between

participants' perceived general knowledge about immunity and the extent to which it changed along with their practices to improve it after the COVID-19 pandemic. A study using Google Trends data also found a significant and positive increase between the rise in cases at the start of the pandemic in January 2020 and various immunity related terms, such as 'immune' ($p < 0.001$) and 'vitamin' ($p < 0.001$).²³

This KAP study is the first of its kind in Pakistan, as it incorporated the use of three different self-rated questions covering a broad range of aspects pertaining to people's awareness and practices regarding immunity. It has a multitude of variables that can be used by researchers and analysts for further evaluations. It will further encourage people in other countries to also perform similar research, thereby generating a worldwide strategy for immunity.

However, the current study also has certain limitations. Firstly, due to city-wide lockdowns, the questionnaire could only be distributed through online channels because of which low-income people could not be targeted since availability of internet is less in low socioeconomic class. The study was subjected to selection bias as the sample was self-selected by the general population, it is very likely that majority of our participants were more self-conscious than the non-responders. As the questionnaire was in the English language only, and it was only available online, most participants of the study were educated enough to access it, spoke English and were in their early 20s. Hence, a fair age demographic profile could not be established. Due to these reasons, the study findings are not as generalisable as they could have been. Also, the study design collected information based on participants' perceived general health, immune status and knowledge of immunity. Hence, any bias the participants may have in their opinion about themselves could not be ruled out. Future studies should have an objective system to rate these traits in people and remove the limitations. As the questionnaire was self-administered, information bias may also be present in the study.

Despite the limitations, the associations found have provided a framework of practices to promote to improve the status of the country. Coordinated action is needed to be taken by the government with the help of health and other economic and social sectors, voluntary organisations, local authorities and the media to spread awareness through different means. With the community's involvement, primary healthcare (PHC) approach should be adopted in all setups as it has proved to play a role in changing the global perception towards health problems.²⁴ The study should be further utilised to help the policy-making sectors to discourage the habits that

negatively affect people, like tobacco tax policies.²⁵ It can also be used to urge the authorities to follow strategies of using healthcare and general resources of the country efficiently.

Conclusion

Many variables were found to be significantly associated with the general adult population of Pakistan's increased self-rated health, immune response and their knowledge regarding it. These variables focused on their health and immunity-promoting efforts, such as nutritional and lifestyle modifications, along with covering their general attitude and perception towards emerging health concerns.

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