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Forming Factors of Family Immunity in Healthy Status and Confirmed COVID-19 Families

Factores Formadores de la Inmunidad Familiar en Familias Saludable y con COVID-19 Confirmado

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SUMMARY

Background: *Family COVID-19 immunity is an approach to responding to stressors and crises caused by COVID-19. This study aimed to analyze the factors that formed family immunity in healthy families with confirmed COVID-19.*
Methods*: A case-control research design of two groups was carried out in August 2021 – March 2022 to analyze the factors forming family immunity in preventing COVID-19 infection, in Surabaya, Indonesia. One hundred four respondents were selected through convenience sampling. Data was collected using a family immunity questionnaire based on sub-variables 1) family belief system; 2) organizational patterns; 3) communication processes; and 4) controlling the spread of infectious disease. Data were analyzed using Chi-Square, and all statistical correlations were considered significant with p-value < 0.05.*
Results: *Several variables were significantly related to COVID-19 status, including family beliefs, an optimistic outlook, organizational adaptability, clear communication, and practical strategies to prevent the virus's transmission. These data highlight the significance of these factors in strengthening family immunity and preventing COVID-19.*
Conclusion: *Family immunity is formed from 10 indicators, namely making meaning of adversity, positive outlook, transcendence and spirituality, social and economic resources, clarity, open emotional expression, building ethical principles, preventing transmission, and limiting contact.*

Keyword*: Immunity, family, healthy, COVID-19.*

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RESUMEN

Antecedentes: *La inmunidad familiar contra la COVID-19 es un enfoque familiar para responder a los factores estresantes y las crisis causadas por la COVID-19. El propósito de este estudio fue analizar los factores que forman la inmunidad familiar en familias saludables y con COVID-19 confirmado.*
Métodos: *Se llevó a cabo un diseño de investigación de casos y controles de dos grupos, en agosto de 2021 - marzo de 2022, para analizar los factores que forman la inmunidad familiar en la prevención de la infección por COVID-19, en Surabaya, Indonesia. 104 encuestados fueron incluidos a través de un muestreo por conveniencia. Los datos se recopilaron mediante*

un cuestionario de inmunidad familiar evaluado en función de las subvariables 1) sistema de creencias familiares; 2) patrones organizacionales; 3) procesos de comunicación; y 4) control de la propagación de enfermedades infecciosas. Los datos se analizaron mediante Chi-Cuadrado y todas las correlaciones estadísticas se presentaron con un valor de $p < 0.05$.
Resultados: *Se demostró que varias variables están significativamente relacionadas con el estado de COVID-19, incluidas las creencias familiares, una perspectiva optimista, la adaptabilidad organizacional, una comunicación clara y estrategias efectivas para prevenir la transmisión del virus. Estos datos resaltan la importancia de estos factores para fortalecer la inmunidad familiar y prevenir la COVID-19.*
Conclusión: *La inmunidad familiar se forma a partir de 10 indicadores, a saber, dar sentido a la adversidad, actitud positiva, trascendencia y espiritualidad, recursos sociales y económicos, claridad, expresión emocional abierta, construcción de principios éticos, prevención de la transmisión y limitación del contacto.*

Palabra clave: *Inmunidad, familia, saludable, COVID-19.*

INTRODUCTION

Corona Virus Disease 2019 (COVID-19) is an emerging pandemic with many impacts, especially in the health sector, creating an international health crisis (1,2). The transmission of COVID-19, which occurs very quickly through droplet transmission, increases the number of cases, and the virus undergoes continuous mutations, giving rise to new variants (3-5). The emergence of a new variant of COVID-19 will prolong the existence of the virus. As a result, humans must coexist with the virus and naturally experience herd immunity (6-9).

Herd immunity, or community immunity, is a term when a large part of the population of an area is immune to a specific disease such as the COVID-19 virus. If enough people are resistant to the cause of a disease, such as a virus or bacteria, it has nowhere to go. While not every single individual may be immune, the group as a whole has protection. Society will be immune through vaccination and natural immunity from virus infection. The immunity developed in individuals will increase resilience in a very long pandemic (5). However, individual immunity is not enough to break the pandemic chain; collaboration from all sectors and levels of society is needed to prevent and deal with COVID-19 (7). Prevention carried out by the community involves the whole community and the smallest unit, namely the family, through family empowerment (10-12). Family empowerment is expected to make the family the spearhead in resolving COVID-19 cases, starting from the minor scale, namely the household unit (13,14).

Both, healthy families and those confirmed with COVID-19 may have immunity in preventing infection transmission (15). The family will provide confidence, organize, communicate, and try to break the chain of transmission for the health of their family members. Through family integration, the handling of COVID-19 can reach the smallest unit (16). The evidence indicates that the status of confirmation of COVID-19 depends on the independence and ability of the family to carry out the health protocol, a family that is healthy and has never been confirmed with COVID-19 is a family that always follows a healthy lifestyle, adheres to the protocol and does not ignore existing policies (17). However, families confirmed with COVID-19 do not mean they are unhealthy, but family immunity that is more careful about COVID-19 is better (18,19).

Family immunity has several sub-indicators that explain the family's importance in preventing COVID-19; the intended sub-indicators are 1) family belief system; 2) organizational patterns; 3) communication processes; and 4) controlling the spread of infectious disease (12,20-22). Family immunity against COVID-19 can be described as a form of approach that is oriented towards family strength in involving the family system through active processes in the form of coping, adaptation, and positive behaviour patterns so that they have resilience in responding to stressors and crises caused by COVID-19. Because of this, it is necessary to identify the characteristics of family immunity from the community in dealing with the pandemic situation in Indonesia (1,23,24). This study aimed to analyze the factors that formed family immunity in healthy and confirmed COVID-19 families.

METHOD

Research design

A case-control research design of two groups was carried out in August 2021 – March 2022 to analyze the factors forming family immunity in preventing COVID-19 infection, in Surabaya, Indonesia. There were assessed indicators of the Family Immunity sub-variable in preventing the spread of COVID-19 in healthy and affected COVID-19 families so that they will know which indicators are valid for forming family immunity.

Study Participants

The respondents were 104 people in Surabaya who were recruited using convenience sampling. Respondents were divided into healthy families and families with confirmed COVID-19. Healthy Families were defined as participants who did not have any confirmed cases of COVID-19 in their family. In comparison, the families with confirmed COVID-19 group were defined by participants with a family history of COVID-19. Both groups were chosen based on eligibility criteria such as age range 18-54 years, residency in Surabaya, absence of mental problems, and ability to read and write.

Instrument and Data Collection

Data was collected using a family immunity questionnaire assessed based on sub-variables 1) family belief system; 2) organizational patterns; 3) communication processes; and 4) controlling the spread of infectious disease. Data collection was carried out by first carrying out the licensing process. Data was collected using a questionnaire through closed questions. Before the instrument was given to the respondents, it was tested with validity and reliability first in the 30 patients with the same characteristics as the study respondents. The average validity value was 0.486 – 0.647 (r table = 0.321), and the validity value was 0.885. The instrument uses a Likert scale with five levels, namely strongly disagree (score 1), disagree (score 2), disagree (score 3), agree (score 4), and strongly agree (score 5). The indicator family belief system with sub-indicators making meaning of adversity, positive outlook, transcendence, and spirituality consists of 10 questions with the highest score being 50, score interpretation being good 26-50, and less than 1-25. Organizational patterns with sub-indicators of Flexibility, Connectedness, and Social and Economic Resources consist of 10 questions with good (score 26-50) and poor (1-25) categories. Communication Processes consisting of Clarity, Open emotional expression, and Collaborative problem-solving sub-indicators comprised of 9 questions with the highest score being 45, a good category in the range of 24-45 and less with a score of 1-23. While the indicator controlling the spread of infectious disease with the sub-indicator builds ethical principles, preventing transmission and limiting contact with 11 questions, for the good category, the score is 29-55, and for the poor category is 1-28.

Data Analysis

Data collected were tabulated and given the coding for analysis in SPSS version 21. Data were analyzed using descriptive and inferential statistics presented in the descriptive statistic table and inferential statistics using Chi-Square; all statistical correlations were presented with p-value < 0.05.

Ethical Consideration

Ethical approval of this study was certified by the Ethical Committee of the Muhammadiyah University of Surabaya, with the number of certificates being 12/EC/KEPK/2020. The respondents first signed the informed consent; they signed voluntarily after they got some explanation about the study from the researcher.

RESULTS

Research conducted on 104 healthy family respondents and families with confirmed COVID-19 status in Surabaya showed that most were aged >40 years, 81 respondents (77.9 %). The most dominant respondents were women (91.3 %), and the education level of senior high school graduates was the most (51.9 %) (Table 1).

Table 1. Characteristics of research respondents

Category	N	%
Age		
< 30 years	8	7.7
30 – 40 years	15	14.4
> 40 years	81	77.9
Gender		
Male	9	8.7
Female	95	91.3
Educational background		
Junior High School	10	9.6
Senior High School	54	51.9
University	40	38.5

According to the findings in Table 2, from the family belief system indicator, healthy families had a greater perspective of diversity, a positive outlook, transcendence, and spirituality than families with confirmed COVID-19. All these variables were strongly associated with the families' COVID-19 status (p-value <0.0001). In COVID-19 prevention, the structure of a family organization, flexibility, and social and economic resources was significantly related to COVID-19 status (p-value < 0.0001). Healthy families had more flexibility and socioeconomic resources, whereas confirmed COVID-19 families had higher connectivity values. Healthy families exhibited higher clarity and openness in their communication procedures, but collaborative problem-solving produced unsatisfactory results. Clarity and openness were significantly related to COVID-19 status (p-value < 0.0001). The ability of healthy families to control the spread of infectious disease demonstrated better ethical standards, which was highly associated with COVID-19 status (p-value < 0.0001). The family's ability to prevent transmission and limit contacts was likewise linked to COVID-19 status (p-value < 0.0001 and 0.0002).

The Bartlett of Sphericity Test results determine whether there was a correlation between variables; the more significant the sample, the more sensitive the Bartlett test was to detect correlations between indicators. The test showed that the value of Kaiser Meyer Olkin (KMO) ed 0.898 so that factor analysis can be carried out. Likewise, with the Bartlett test value with Chi-Squares = 511.309 and significant at 0.0001, it can be concluded that the factor analysis test can be continued (Table 3).

The results of the eigenvalue > one only on indicator 1 (eigenvalue = 5.224) and indicator 2 (eigenvalue = 1.015). Therefore, the two indicators explain the variation of 62.389 %, which was divided into family belief systems (52.236 %) and organizational patterns (10.154 %) (Table 4).

The sub-indicators of family immunity are grouped into 1 component, proving that the sub-indicators meet the requirements and showed valid results. The highest value of the sub-indicators was shown in a positive outlook (0.862) and building ethical principles (0.797). Thus, the construction of family immunity according to the loading factor based on the highest value to the lowest includes a positive outlook, building ethical principles, clarity of communication, flexibility, transcendence, spiritualism, preventing contagion, collaboration, understanding differences, social and economic resources, and limiting contact. So, to assess the Family Immunity variable can be seen from the ten indicators (Table 5).

Table 2. Indicators of Family Immunity in healthy and Confirmed COVID-19 families

Indicator	Sub Indicator	COVID-19 Status				P Value; X^2
		Healthy Family		Positive COVID-19		
		n	%	n	%	
Family belief system	Understanding the Difference					
	Less	14	13.5	37	35.6	0.0001*
	Good	45	43.3	8	7.7	34.951
	Positive outlook					
	Less	10	9.6	38	36.5	0.0001*
	Good	49	47.1	7	6.7	46.797
	Transcendence and spirituality					
	Less	19	18.3	38	36.5	0.001*
	Good	40	38.5	7	6.7	28.129
Organizational pattern	Flexibility					
	Less	13	12.5	40	38.5	0.0001*
	Good	46	44.2	5	4.8	45.658
	Connectedness					
	Less	33	31.7	28	26.9	0.519
	Good	26	25.0	17	16.3	0.416
	Social and economic resources					
	Less	17	16.3	35	33.7	0.000*
	Good	42	40.4	10	9.6	24.482
Communication Process	Clarity					
	Less	20	19.2	30	28.8	0.001*
	Good	39	37.5	15	14.4	10.981
	Openness					
	Less	16	15.4	42	40.4	0.0001*
	Good	43	41.5	3	2.9	45.375
	Collaborative					
	Less	36	34.6	28	26.9	0.900
	Good	23	22.1	17	16.3	0.016
Controlling the spread of infectious disease	Establish ethical principles					
	Less	11	10.6	37	35.6	0.0001*
	Good	48	46.2	8	7.7	41.523
	Prevent transmission					
	Less	19	18.3	38	36.5	0.0001*
	Good	40	38.5	7	6.7	28.129
	Limit contacts					
	Less	25	24.0	33	31.7	0.002*
	Good	34	32.7	12	11.5	9.920

*p-value < 0.05

Table 3. Results of Factor Analysis of the Bartlett of Sphericity Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.898
Bartlett's Test of Sphericity	Approx. Chi-Square	511.309
	df	45
	Sig.	0.0001

Table 4. Results of Principal Component Analysis for Family Immunity Sub-Indicators

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.224	52.236	52.236	5.224	52.236	52.236
2	1.015	10.154	62.389	1.015	10.154	62.389
3	.867	8.669	71.059			
4	.753	7.534	78.593			
5	.527	5.266	83.859			
6	.420	4.201	88.060			
7	.367	3.669	91.729			
8	.332	3.324	95.053			
9	.271	2.712	97.766			
10	.223	2.234	100.000			

Extraction Method: Principal Component Analysis.

Table 5. Results of Component Matrix Analysis of Family Immunity Sub-Indicators

Indicator	Component	
	1	2
Understanding the Difference	0.667	0.386
Positive outlook	0.862	0.211
Transcendence and spirituality	0.746	0.379
Flexibility	0.762	-0.193
Social and economic resources	0.600	-0.034
Clarity	0.768	-0.242
Openness	0.688	-0.123
Establish ethical principles	0.797	-0.311
Prevent transmission	0.726	-0.448
Limit contacts	0.558	0.518

Extraction Method: Principal Component Analysis.
a. two components extracted.

DISCUSSION

Analysis of the factors that make up family immunity consists of indicators of family belief systems, organizational patterns, communication processes, and controlling the spread of infectious disease (25). Each of these indicators consists of 3 sub-indicators family belief system with sub-indicators making meaning of adversity, positive outlook, transcendence and spirituality, Organizational patterns with sub-indicators Flexibility, Connectedness, Social and Economic Resources, Communication Processes consisting of sub-indicators Clarity, Open emotional expression and Collaborative problem solving and controlling the spread of infectious disease with sub-indicators Build ethical principles, Preventing transmission and Limiting contact. In the research results from 12 sub-indicators, only ten indicators are significant, so only ten indicators can form family immunity, namely making meaning of adversity, positive outlook, transcendence and spirituality, social and

economic resources, clarity, open emotional expression, building ethical principles, preventing transmission and Limiting contact (2,10,12,26).

The family belief system is essential and can influence a family's intention to do something; through self-belief, attitudes and actions will also be implemented (27). In preventing COVID-19, families with higher confidence are described as healthy families than families with confirmed COVID-19; healthy families are appropriate because, through this belief, families can take precautions against COVID-19 (20). Beliefs are formed from making meaning of adversity, positive outlook, transcendence, and spirituality. Families will form beliefs if they can give meaning to what they encounter, always think positively, and have reasonable spiritual beliefs (28). In line with research showing that trust in the family is formed due to the strengthening of each other from family members, family beliefs will be stronger if family relationships are closer; the positive impact is that families can become independent and understand more about the health status of their family members (20,21,29,30).

Family organizational patterns show how families can organize their members to be better. Through good administrative management, families can control their activities, health conditions, harmonization, and all things so that families become more comfortable and close to each other (31). A good family can perform family functions by coordinating and managing the family to create harmony. Families with good organization can be more flexible and organize social and economic resources within the family (32).

The ability of the family to communicate is an essential element in fostering good relationships in the family. Within the family, the communication that is established is communication that can provide something that can be given to every other family member so that with this communication, problems that occur between family members can be discussed by taking the best solution (33). Communication is a source of the emergence of a problem if it is not done correctly and causes a lot of miscommunications; communication needs to be done carefully and adjusted to the communication partner of an individual. The ability to communicate in the family will reflect family conditions (34). Families with good communication provide support, give advice, and tell if other family members are not right. Communication can also make the family calmer, and another will tell each other stories to express the emotions other family members are feeling (35-37).

The family's ability to control the spread of infectious disease is built on the ethical principle of Build, preventing transmission, and Limiting contact. The principles of the family to control the spread of the COVID-19 virus infection must be instilled in family members from an early age. Families with healthy conditions are always healthy because they comply with health protocols so that before they fall sick, the family can prevent it with the knowledge that the family already has (25). Prevention capabilities will build awareness from the family to form commitment and resilience in dealing with a pandemic (7).

The limitations of research conducted during a pandemic are that researchers cannot optimally interact directly with respondents, so all coordination and data collection is done online. The selection of respondents is still not evenly distributed in all Surabaya locations, so it is necessary to identify them from the entire Surabaya community.

CONCLUSION

Family immunity in the family is formed by the family belief system, organizational patterns, communication processes, and controlling the spread of infectious diseases. There are ten significant sub-indicators to explain family immunity: making meaning of adversity, positive outlook, transcendence and spirituality, social and economic resources, clarity, open emotional expression, building ethical principles, preventing transmission, and limiting contact.

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Conflict of Interest

The researcher declares that there is no conflict of interest in this study so that the research is guaranteed to have no problems between members and the article's authorship.

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