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Original Article

Assessment of knowledge, attitude and behavior towards antibiotic use in primary health care patients in Fayoum Governorate, Egypt

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1. Introduction

Antibiotics are the most frequently prescribed drugs; they are often used for the treatment of upper respiratory tract infections, including a sore throat, common cold, and rhinitis, even though viruses cause most of these illnesses.[1] It has been estimated that from 20% to 50% of antibiotic use is either unnecessary or inappropriate [2,3] this contributes to rising up the complexity of antibiotic resistance worldwide, with a negative impact on patient outcomes. [4,5]

The inappropriate and excessive uses of antibiotics arise from a complex interaction between numerous factors related to patient's knowledge and attitude, such as patient demand; wrong habits of self-medication; non-compliance; patients' experience with antibiotics; and insufficient patient education.[6,7]

Many factors could influence doctors' decisions, leading them to breach the principles of a good clinical practice, For example, fear of possible complications in their patients, or a desire to fulfill patients' expectations besides diagnostic uncertainty.[8–10]

The situation in developing countries is more critical because the use of antibiotics without medical guidance is largely facilitated by inadequate regulation of the distribution and sale of prescription drugs.[11] As regarding the Egyptian pharmacies, most antibiotics are handed out from pharmacies without proper prescriptions. As well as, the majority were incorrectly indicated for viral or self-limiting conditions.[12] This study aimed to assess the current knowledge, attitude and behavior regarding antibiotics use among the general population in Fayoum Governorate with exploring the different factors affecting the misuse of antibiotics.

2. Subject and methods

A cross-sectional descriptive study was carried out in Fayoum Governorate; Fayoum is one of 27 Governorates in Egypt, located in the southwest of Cairo with an area of 1827 km^2 and an estimated population of 3.359.399 million.[13]

The survey was conducted over a period of 4 months between January 2017 and April 2017. The study population was randomly selected from different primary health care facilities (PHC) in five selected districts: (Fayoum district including both urban areas as Bander El-Fayoum and rural areas as Markaz El-Fayoum), Etsa, Abshawai, Senwres, and Tamya districts.

The study population was selected using a systematic random sampling from a patient's register list, used as the sampling frame, the first subject was randomly picked out from this sampling frame, and subsequently, every fourth patient was spontaneously chosen to participate. If a selected patient refused to take part in the study, the next patient was approached until the recommended sample size was recruited.

A total sample size of 385 persons was intended. The sample size was calculated according to district population by Epi Info 2000 based on a prevalence of 50% with a precision of 5%, and a confidence interval of 95%. The calculated sample size was doubled to achieve the same precision. Finally, the sample was increased by 10% to overcome problems related to non-responses and missing data. 247 of them were excluded since they refused to participate or did not complete the major sections of the questionnaire, so the final sample was 600 participants. One hundred persons were selected from each PHC facility. The study obtained a high response rate of (76.5%), which minimizes potential response bias.[14]

2.1. The study tool: The questionnaire

This study was based on a self-administered questionnaire. A total of 28 questions were included in the final form. The questionnaire was designed based on previously conducted studies.[15–17] It was divided into two parts; the first part; socio-demographic characteristics, number of antibiotic uses and frequency of visits to the outpatient clinic in the past 12 months. The second part; assess the basic knowledge (9 questions); attitude (9 questions) and behavior (10 questions) of the participants.

A 3 point scale was used; (true, false and do not know) for knowledge questions; the right answer was scored 1, don't know and the wrong answer was scored 0 with a maximum total score of 9, (agree, disagree and not sure); for attitude questions; right answer was scored 2, a neutral answer was scored 1 and a wrong

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answer was scored 0 with a maximum total score of 18 and (always, sometimes and never) for behavior questions; good practice was scored 2, inadequate answer was scored 1 and bad behavior was scored 0 with a maximum total score of 20.

The questionnaire was designed in English but was translated into Arabic; the validity of the translation was assured by a process of forwarding and backward translation with personnel who are fluent in both languages. Furthermore, it was field-tested on a pilot sample of 60 participants (10% of the target sample), some modifications were made. The results of the pilot sample were not included in the sample size.

2.1.1. Data analysis

SPSS version21 was used to analyze data. Mean and S.D were calculated for quantitative variables in the form of simple descriptive analysis and independent *t*-test or one way ANOVA were used as a test of significant; p-value of ≤ 0.05 was considered statistically significant. Categorical data were analyzed by computing percentages. Multiple linear regressions for predicting score of KAP and multiple logistic regressions to show factors associated antibiotic misuses were obtained.

2.2. Ethical considerations

This study was approved by Research Ethical Committee of Fayoum University. A patient consent form was given to those who were able to read while oral ascents were taken from illiterate participants. The participants were assured of confidentiality.

3. Results

3.1. Participants' characteristics

The sample was 600, the majority was males (50.3%), (73.8%) were from rural areas. The age group was predominantly between 31 and 45 years old (37.2%).About (36.3%) had an intermediate level of education and (30.2%) had a university education, (45.5%) were not working with insufficient income for (57.3%) of participants. Moreover, almost (31.3%) reported 6–10 times of antibiotics intake, (35.8%) reported 1–5 visits to outpatient's clinic with (51.3%) of participants had no health insurance.

3.2. Knowledge, attitude, and behavior towards antibiotics use

3.2.1. Regarding the participants' knowledge, only (19.3%) had insufficient knowledge about the effectiveness of antibiotics for treatment of cold and cough. Moreover (42%) have not known about antibiotic resistance. The mean score of study group knowledge was 5.3 ± 1.8. Most of the participants mentioned the correct answers with a percentage over 50 for approximately all the questions, except for 3 questions, namely, antibiotics speed up the recovery of cold and cough (19.3%), resistance to antibiotic (42.3%), and allergy to antibiotics (45.3%), Fig. 1.

3.2.2. Regarding the participants' attitude/belief, the mean attitude score of the study group was 7.2 ± 2.7. About (59.3%) thought that antibiotics can cure any diseases and (63.7%) found that antibiotics can prevent any illnesses from becoming worse. Among all participants, (47.3%) agreed with taking a low dose of antibiotics is better than nothing. About (55.7%) believed that newer/more expensive antibiotics would give a better effect. Two-thirds of the participants expected to prescribe antibiotics when visiting the doctor office, Fig. 2.

3.2.3. The mean behavior score of study group towards using the antibiotics was 11.5 ± 3.5. About (54.8%) stop taking antibiotics by themselves if feeling no improvement, more than half (53.7%) prefers initially to ask the pharmacist when getting sick and about (32.7%) do self-medication, Fig. 3.

There was a statistical significant difference between the Mean knowledge score and four different characteristics; namely; age, occupation, income, education with $p < 0.05$. In contrast for gender with $P < 0.05$. The Mean attitude and behavior score demonstrated a statistically significant difference to only age and income with $P < 0.05$, Table 1.

3.2.4. Multiple linear regression analyses were performed to show the significant predictors affecting knowledge, attitude, and behavior. For knowledge; income, education, occupation, number of times of antibiotics taken over 3 months, and number of visits to outpatient clinics over the past 12 months were found to be significant predictors, $P < 0.05$. For attitude; income, occupation, and a number of visits to outpatient clinics over the past 12 months were identified as significant predictors, $P < 0.05$. Regarding behavior; age, income, and education were significant predictors, $P < 0.05$, Table 2.

3.3. Factors affecting antibiotics misuse

The results of multivariate logistic regression analysis determined that regarding incomplete antibiotic course, urban residents [OR 1.68–95% CI (1.14–2.47)], with insufficient income

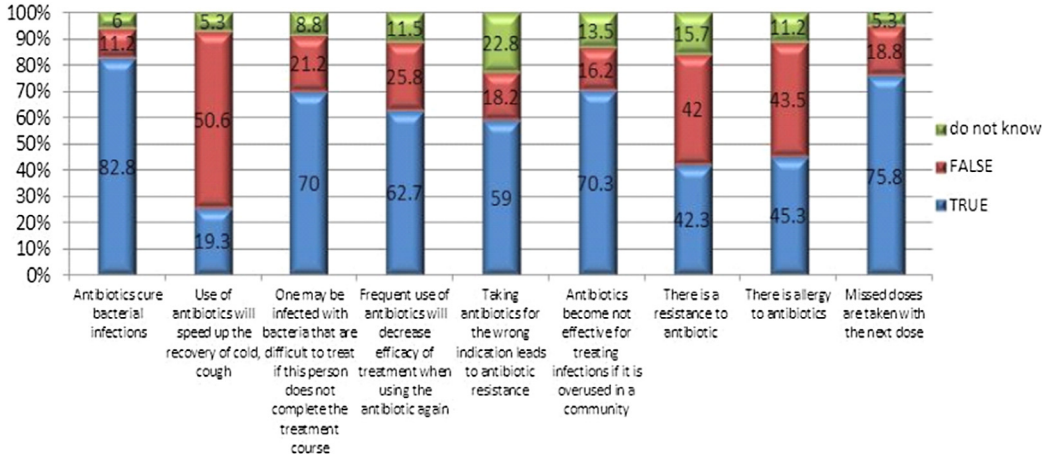

Fig. 1. Percent distribution of all participants according to Knowledge.

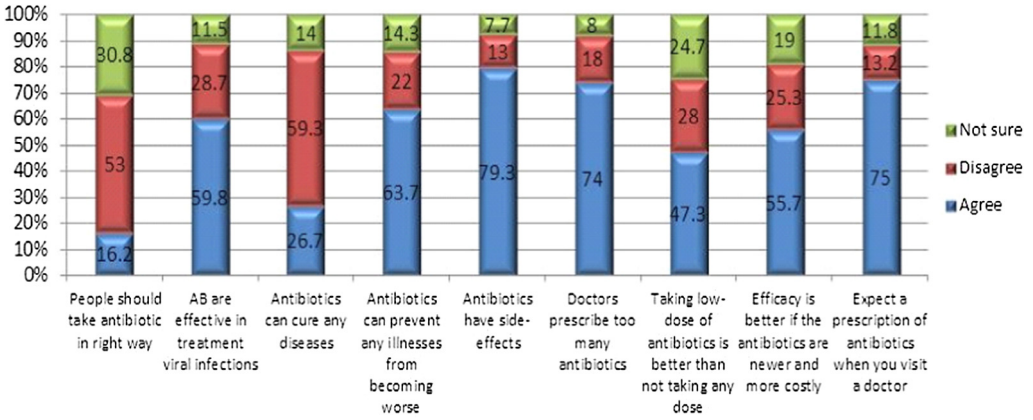

Fig. 2. Percent distribution of all participants according to Attitude/belief.

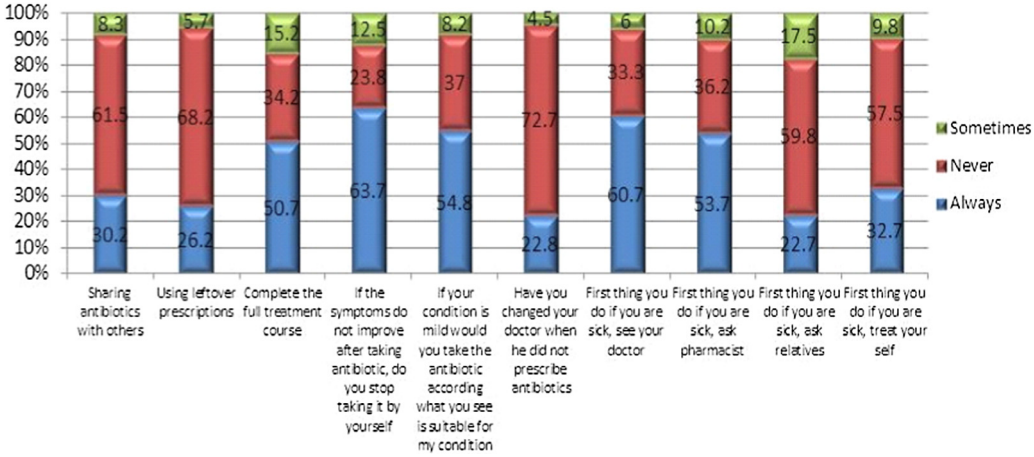

Fig. 3. Percent distribution of all participants according to behavior.

[OR 1.61–95% CI (1.06–2.45)] had about one and a half folds risk to incomplete their full course of antibiotic, also those with lower education and were not covered by health insurance had about two folds risk [OR 1.93–95% CI (1.27–2.94)], and [OR 1.94–95% CI (1.38–2.72)]. As regards stop taking antibiotic by themselves, those with lower education had about two folds risk [OR 1.93–95% CI (1.30–2.86)]. On the other hand for change doctor, if he did not prescribe antibiotics; the risk increased more than two folds when the participants were not employed, [OR 2.27–95% CI (1.41–2.64)], but the risk decrease among participants with insufficient income and those were not covered by health insurance [OR 0.24–95% CI (0.16–0.35)] and [OR 0.52–95% CI (0.32–0.82)], respectively. Also, persons with insufficient income had about one and a half folds risk to not seeing their doctor during the period of illness [OR 1.58–95% CI (1.09–2.28), Table 3.

4. Discussion

Antimicrobial overuses are related to many factors such as patient knowledge and attitude toward antibiotic. A community-based study conducted by done by Elmasry et al. and displayed the pattern of antibiotic abuse among the population in Cairo; assessing the knowledge, attitudes, and behavior of the Egyptian population towards antibiotics.[18] While there were other studies either done amongst the physicians and pharmacists in a university hospital in Minya District by Osama and Dooling et al. or focused only on assessing the antibiotic use and resistance in a specific department (orthopaedic department) in an Egyptian university hospital which don by Hassan et al.[19–21]

The most important strength of the current study is a community-based study targeting both genders and represented both the rural and urban communities. Limitations of the study were associated with poor recall the number of visits to the outpatient clinic, number of times of antibiotic use. Therefore, participants' knowledge, attitude, and practices may not always be consistent with their actual behavior. The results obtained were based on self-reported information, which depends mainly on honesty and recalls ability of the respondents, as well as their understanding of the questionnaire.

4.1. Regarding knowledge

Although the knowledge of the study group was generally good; some findings demonstrated that participants had poor knowledge pertaining to the effect of the inappropriate indication of antibiotic and the antibiotic resistance. Comparatively, a study done in Kuwait revealed that (54.4%) of participants agreed on the ability of antibiotics to speed up the recovery from most coughs and colds and another (51%) did not expect that the unnecessarily use of antibiotics can increase the resistance of bacteria to them.[22]

Likewise, some studies in Britain, Europe, Denver, Wisconsin and Minnesota illustrated that (between 54 and 55%) of participants incorrectly find that antibiotics could be used in treatment of cold.[23,24] Additionally, between 44% and 49% of respondents in

Table 1
Relation between participants' characteristics and knowledge, attitude and behavior about antibiotic use.

Demographic Variables	Knowledge score		Attitude score		Practice score	
	Mean ± SD	P-value	Mean ± SD	P-value	Mean ± SD	P-value
Age						
18–30+	5.7 ± 1.8	<0.0001*	7.6 ± 2.5	0.001*	11.3 ± 3.5	0.044*
31–45+	5.1 ± 1.7		6.6 ± 2.8		11.3 ± 3.7	
46–60	5.0 ± 1.6		7.5 ± 3.0		11.8 ± 2.9	
More than 60	4.7 ± 1.9		7.4 ± 2.3		12.6 ± 3.4	
Sex						
Male	5.3 ± 1.7	0.507	7.2 ± 2.8	0.524	11.5 ± 3.6	0.878
Female	5.2 ± 1.9		7.1 ± 2.6		11.6 ± 3.4	
Occupation						
No work	5.1 ± 1.7	<0.0001*	7.1 ± 2.7	0.386	11.5 ± 3.4	0.348
Worker	4.5 ± 1.7		7.3 ± 2.4		11.5 ± 3.4	
Employee	5.6 ± 1.3		7.0 ± 2.9		11.1 ± 3.2	
Others	6.5 ± 1.8		7.6 ± 2.7		12.1 ± 3.9	
Residence						
Rural	5.2 ± 1.7	0.013*	7.1 ± 2.8	0.291	11.5 ± 3.4	0.969
Urban	5.6 ± 1.9		7.4 ± 2.5		11.5 ± 3.7	
Education						
Not educated	4.8 ± 1.7	<0.0001*	7.5 ± 2.8	0.525	11.0 ± 3.9	0.127
Primary	4.4 ± 1.9		7.2 ± 1.8		12.1 ± 3.2	
Preparatory	4.4 ± 1.3		6.7 ± 3.3		12.5 ± 2.9	
Intermediate	4.8 ± 1.3		7.1 ± 2.6		11.7 ± 3.1	
University	6.5 ± 1.7		7.3 ± 2.8		12.4 ± 3.8	
Income						
More than sufficient	6.3 ± 1.3	<0.0001*	6.3 ± 2.5	0.001*	9.5 ± 4.1	<0.0001*
Sufficient	6.3 ± 1.8		7.2 ± 2.4		11.2 ± 3.8	
Not sufficient	4.9 ± 1.7		7.1 ± 2.8		11.9 ± 3.2	
Not sufficient and lend money	4.8 ± 1.6		8.1 ± 2.5		11.7 ± 3.3	

Table 2
Multiple linear regression analyses for predicting score of knowledge, attitude & practice.

Variables	B	t	Sig.	95.0% Confidence Interval for B	
				Lower Bound	Upper Bound
Knowledge					
(Constant)	2.689	7.930	<0.0001	2.023	3.355
Income	0.599	6.854	<0.0001	0.427	0.770
Education	0.237	4.474	<0.0001	0.133	0.341
Occupation	0.237	3.372	0.001	0.099	0.374
Number of Antibiotics taken through 3 months	-0.203	-2.337	0.020	-0.374	-0.032
Number of visits to outpatient clinic during past 12 months	0.122	2.243	0.025	0.015	0.229
Attitude					
(Constant)	7.083	15.400	<0.0001	6.180	7.987
Number of visits to outpatient clinic during past 12 months	0.259	2.875	0.004	0.082	0.435
Income	-0.403	-2.819	0.005	-0.683	-0.122
Occupation	0.206	2.162	0.031	0.019	0.393
Practice					
(Constant)	11.496	16.486	<0.0001	10.127	12.866
Income	-0.688	-3.888	<0.0001	-1.036	-0.340
Age	0.433	2.738	0.006	0.122	0.744
Education	0.204	2.017	0.044	0.005	0.402

a study done by Dawn et al. agreed with using of antibiotics for cold and flu.[25]

These high figures were explained with improperly using the term "germ" in providing medical advice instead of using the microbiological term "bacteria" or "virus". The healthcare providers play an important role in alteration these misconceptions. The knowledge score was higher for younger age group (5.7 ± 1.8) and university educated participants (6.5 ± 1.7).

A similar result was obtained in Malaysia, by Lim and The and was explained as young adults are much more aware of the health issues with the help of modern technology and developed education than elder generations.[26] In addition, those living in urban areas (5.6 ± 1.9) had higher knowledge score than rural inhabitants (5.2 ± 1.7). The reason for that could be the limited accessibility to healthcare, un-coverage with health insurance, economic barriers or interfering with some improper traditions and beliefs. Hence, the health facility-based health education program side by side with a community-based health education program targeting the different sectors in the community will be the most effective way in directing the public to the rational use of the antibiotic.

4.2. Regarding attitude/belief and behavior

It was found that (47.3%) agreed with taking a low dose of antibiotics is better than not taking at all, (55.7%) believed that newer/more expensive antibiotics would give a better effect.

Table 3
Multiple logistic regression analyses showed factors associated with some points of antibiotic misuse.

Factors	Significance	Estimate relative risk (95% CI)
Incomplete antibiotic course		
Residence (urban vs. rural)	0.009	1.68 (1.14–2.47)
Education (Till secondary vs. university education)	0.002	1.93 (1.27–2.94)
Income (Not sufficient vs. sufficient)	0.027	1.61 (1.06–2.45)
Health insurance (not having vs. having)	<0.0001	1.94 (1.38–2.72)
Stop taking antibiotic by themselves		
Education (Till secondary vs. university education)	0.001	1.93 (1.30–2.86)
Change physician when not prescribing antibiotics		
Occupation (not employed vs. employed)	0.001	2.27 (1.41–2.64)
Income (Not sufficient vs. sufficient)	<0.0001	0.24 (0.16–0.35)
Health insurance (not having vs. having)	0.003	0.52 (0.32–0.82)
During illness person was not seeing the physician		
Income (Not sufficient vs. sufficient)	0.014	1.58 (1.09–2.28)

Furthermore, about 74% of respondents urged that doctors prescribe too many antibiotics and (75%) of the participants expected to prescribe antibiotics when visiting the doctor office. This was explained by Awad [22] as using of some physicians, antibiotics prescription as a tool to satisfy their patients to guarantee their visits in future, even though they feel that it is unnecessary. It was also explained by Linder and Singer, Lam and Lam and Farooqi.[28–30]

About (63.7%) believe that antibiotics prevent any illnesses from becoming worse and (51.3%) believe that antibiotics can cure any diseases. Additionally, about (61.5%) of participants tended to change their doctor in case did not prescribe antibiotics. A study done in Jordan by Sawair et al. [27] reported that about (19.7%) of patients admitted, they consulted another physician to obtain antibiotics when their first physician did not prescribe any. Physicians should help into eliminating all these misconceptions and start a positively effective patient-centered care.

The study done by Osama [20] in Egypt revealed the high prevalence of unwarranted antibiotic prescribing and dispensing for outpatients with ARIs among both physicians and pharmacists in Minya District, Egypt. Opening a clear channel of doctor-patient communication and building a good relationship and sharing the information with patients through overcoming the problem of over-prescription and misuse.[31]

Self-medication and non-doctor prescriptions among Participants of the study occurred in different forms; namely; using the leftover prescriptions (66.7%), stop taking antibiotics by themselves when found no improvement (63.7%), self-medicated with the antibiotics (32.7%), taking antibiotic according to what they see is suitable for their condition and initially asking the pharmacist when getting sick (53.7%).

Some findings demonstrated in Kuwait and represented that 44.3% of the study participants used leftover antibiotics.[22] Moreover, the percentage of self-medication was higher compared to the findings illustrated in Kuwait (27.5%). However, it is notable that this percentage is lower than what reported in two studies conducted by Sawair and Abasaeed et al. in countries the Middle Eastern which ranged between 40.7% and 78%.[27,32] The pattern of self-medication may be related to the poor socioeconomic status, the high cost of physicians' fees, and inaccessibility of healthcare in some areas.

The remarkable dispensing of antibiotics from the community of pharmacies in Egypt and other countries as Yemen, Saudi Arabia and Uzbekistan without proper prescriptions or on the advice of the pharmacist for conditions that are either viral or self-limiting as reported by Sabry and Belkina [12,33] point out to the importance of involving the pharmacists within the process of improving the public knowledge and attitude towards antibiotics.

The results of multivariate logistic regression analysis identified that urban residents with insufficient income and low educated participants who were not covered with health insurance need to be targeted to change their negative attitudes and behaviors towards non adherence to antibiotic treatment course. Also, persons with insufficient income had about one and half folds risk not seeing their doctor during the period of illness. The absence of any correlation between knowledge score and (attitude, behavior) score of the studied group could be explained by either recall bias or lack of inspiration and motivation regarding the direct and indirect effect of antibiotic misuse.

5. Conclusion

This study provides a baseline of the knowledge, attitude, and behavior regarding antibiotics among the Egyptian community. Our population has an insufficiency in their knowledge toward antibiotic uses; expressed poor attitudes, as well as many bad practices of antibiotics use. Their knowledge, attitude and behavior toward antibiotic are associated with several socioeconomic factors as residence, education and occupation. This model can be a stepping-stone for stakeholders is used as a guide targeting areas of increasing public awareness about the proper use of antibiotic, promoting the attitude and changing the misbehavior towards antibiotic. With this intention, campaign, postings, slogans could be used to inspire people about using the antibiotics when indicated and prescribed only by the health professional, for protection from its negative consequences.

Declaration of conflict of interest

There is no conflict of interest as there are no commercial or financial relationships from any institution or organization that could be construed as a potential conflict and all the expenses are covered by the authors. There is no grant or any financial support, equipment.

The authors declare that this manuscript did not previously publish or considered for publication in any other journal.

Ethical consideration

This study was reviewed and approved by the Faculty of Medicine - Fayoum University Research Ethical Committee, and a waiver of consent form was approved. Before distributing the questionnaire, an information sheet describing the objectives of the study together with a patient consent form was given to participating patients or one of his/ her relatives (if s/he was illiterate) assuring him/her of the confidentiality of his/her information. All patients had the right not to participate in the study. Both the researchers and patients were culturally matched and accepted to each other as they were use the same vocabulary and expressions.

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