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The Relationship between Health Education and Patients' Experiences and Patients' Knowledge of Complications of Diabetes Mellitus at the Makassar City General Hospital

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Abstract: Diabetes mellitus (DM) is a chronic metabolic disorder characterised by elevated blood glucose levels (hyperglycaemia), caused by an imbalance between insulin supply and demand. Insulin is required to facilitate the entry of glucose into cells so that it can be utilised for cellular metabolism and growth. This study aimed to obtain an overview of patients' knowledge regarding complications of diabetes mellitus at Daya General Hospital, Makassar, conducted from 14 to 28 January 2013. It was a descriptive analytical study using a cross-sectional method with a sample size of 42 respondents who met the selection criteria through purposive sampling. Data were collected via a questionnaire. The collected data were processed and analysed using computerised methods with appropriate statistical tests. Data analysis included univariate and bivariate analyses using the Chi-Square test, with a significance level of α=0.05. H0 was rejected if $p<0.05$ and accepted if $p>0.05$. The results of this study indicate that there is a relationship between health education and knowledge ($p = 0.003 < \alpha = 0.05$) and inpatient experience ($p = 0.004 < \alpha = 0.05$) with patients' knowledge of DM complications. Thus, the better the health education and the patient's inpatient experience, the better the patient's knowledge of DM complications.

Keywords: *Health Education, Hospital Experience, Knowledge of Diabetes Mellitus Complications.*

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Introduction

Diabetes mellitus is a condition characterised by high levels of glucose (simple sugar) in the blood because the body cannot produce or utilise insulin sufficiently. Many people with diabetes are unaware that they have the condition. This is due to a lack of information in the community about diabetes, particularly its symptoms. The majority of diabetes cases are type 2 diabetes, which is caused by genetic factors. However, genetics is not the primary cause of developing diabetes, as the risk is only 5%. Type 2 diabetes is more common in people who are obese and as a result of their lifestyle (Barnard, 2011).

Diabetes itself is a chronic condition that is managed for life, meaning the progression of the disease continues, and at some point may lead to complications. Diabetes mellitus usually progresses slowly, with symptoms ranging from mild to severe, and can even lead to death due to both acute and chronic complications. Thus, diabetes is not a minor condition. According to several reviews, diabetic retinopathy is a leading cause of blindness in young adults; the risk of death from cardiovascular disease and stroke is 2–4 times higher; diabetic nephropathy as the main cause of end-stage renal failure, with eight out of ten people with diabetes dying from cardiovascular events and diabetic neuropathy, the main cause of non-traumatic amputations in young adults (Permana, 2009).

The World Health Organisation (WHO) predicts that the number of people with type 2 diabetes mellitus in Indonesia has risen sharply over the last 10 years; in 2000 there were 8.4 million people with the condition, rising to 21.3 million by 2010. Meanwhile, the International Diabetes Federation (IDF) estimates that by 2030, 552 million people will have diabetes. This represents an increase of approximately 200 million people from the 2011 figure of 346 million, whilst the 2009 figure stood at 285 million (Maradona, 2012).

According to data from Daya General Hospital in Makassar, there were 230 patients in 2010 and 259 in 2011, whilst data for 2012 from January to September showed 237 patients, of whom 73 had diabetic ulcers and 164 did not; furthermore, approximately 75% of DM patients had a fasting blood glucose level above 220 mg/dl. These figures indicate that the number of patients with diabetes mellitus complications at Makassar City Daya General Hospital remains high (Medical Records of Makassar City Daya General Hospital, 2012).

Knowledge regarding diabetes mellitus complications is the result of cognition, which occurs after an individual perceives a specific object. Knowledge or cognition is a crucial domain in the formation of an individual's actions. The formation of new behaviour begins with knowledge of a stimulus in the form of material or an object regarding the complications that arise, thereby generating new knowledge in the subject and subsequently eliciting an internal response in the form of an attitude towards the object they have come to know; this ultimately leads to a far better response. In this context, health education and experiences of

inpatient or outpatient care are considered to influence patients' knowledge of DM complications.

Materials and Methods

Location, population and study sample

Based on the issues under investigation, this study is a descriptive-analytical *study* using *a 'cross-sectional study'* approach. The study was conducted at Daya General Hospital in Makassar, specifically in the Internal Medicine Ward and the Internal Medicine Outpatient Clinic. The study was carried out from 14 to 28 January 2013.

The study population comprised all patients with diabetes mellitus, including those admitted to the Internal Medicine Ward and those receiving outpatient care at the Internal Medicine Outpatient Clinic of Daya General Hospital in Makassar; the total number of diabetes patients in 2012 was 237. Meanwhile, the sample in this study comprised all patients with diabetes mellitus receiving treatment at Daya General Hospital in Makassar, including those admitted to the Internal Medicine Ward and those attending the Internal Medicine Outpatient Clinic, totalling 42 samples that met the study's inclusion criteria.

The number of respondents at Daya General Hospital, Makassar, who met the inclusion criteria, was 42

The inclusion criteria for this study were as follows:

- Respondents willing to participate in the study
- Patients who were conscious and cooperative
- Inpatients and outpatients
- Patients who can read and write
- Aged 21–60 years

Exclusion criteria for this study are:

- Ethical objections
- Refusal to participate
- Circumstances that make it impossible to conduct the study
- As well as the presence of conditions or illnesses that interferes with the measurement or interpretation of the research results.

Data Collection

Data collection utilised secondary data, namely data obtained from the research site, specifically from the medical records department of Dya General Hospital in Makassar, whilst primary data was derived from questionnaires. Following data collection, the data was processed to transform it into information, which was then utilised for decision-making processes, particularly in *hypothesis* testing. The steps involved in this data processing procedure are as follows:

Editing

The editing process involves checking each completed questionnaire for data completeness, consistency, and uniformity.

Coding

At this stage, a list of variables contained in the questionnaire is created. Subsequently, to facilitate data entry, a coding format is created; the results of the questionnaire coding are then transferred into a coding table, and at this point the data is ready to be entered into the computer

Tabulation

Once the data has been coded, it is grouped into a table according to characteristics relevant to the research objectives. In this case, a frequency distribution table is used to facilitate data analysis.

Data Analysis

The collected data was then tabulated in a table with the variables to be measured. Data analysis was carried out through the stages of editing, coding, tabulation and statistical testing. Univariate analysis was performed using frequency distribution analysis.

With the aid of *the SPSS* programme, the data is analysed using *univariate* statistical tests for individual variables considered relevant to the research, and *bivariate* analysis to examine the distribution or relationships between several variables considered relevant, using the *Chi-Square* test.

Data analysis was carried out by testing the Null Hypothesis (H0) or the hypothesis to be rejected using the *Chi-Square* test. The significance level was set at α=0.05, whereby H0 is rejected if $p < 0.05$ and H0 is accepted if $p > 0.05$.

If $p < \alpha = 0.05$, the null hypothesis is rejected and the alternative hypothesis is accepted, meaning that there is a relationship between health education and treatment experience and patients' knowledge of the complications of diabetes mellitus. Conversely, if $p > \alpha = 0.05$, the null hypothesis is accepted and the alternative hypothesis is rejected, meaning that there is no relationship between health education and treatment experience and patients' knowledge of the complications of diabetes mellitus.

Research Results

Results of Univariate Analysis

Table Distribution of Respondents by Age in the Inpatient Ward and Outpatient Department of Daya General Hospital, Makassar City, 2013

Age (in years)	f	%
21–30	0	0
31–40	8	19.0
41–50	16	38.1
51–60	18	42.9
Total	42	100.0

Source: Primary Data, January 2013

Based on Table 1, it can be interpreted that of the 42 respondents, the largest age group was 51–60 years old, comprising 18 (42.9%), whilst the smallest age group was 21–30 years old, comprising 0 (0%).

Table 2: Distribution of Respondents by Education Level in the Internal Medicine and Outpatient Internal Medicine at Daya General Hospital, Makassar City, 2013

Education	f	%
None	4	9.5
Primary	6	14.3
Lower Secondary	16	38.1

Secondary Academic/Higher Education	10 6	23.8 14.3
Total	42	100.0

Source: Primary Data, January 2013

Based on Table 2, it can be interpreted that out of a total of 42 respondents, the largest group consisted of those with lower secondary education (16 people, 38.1%), whilst the smallest group comprised those who had never attended school (none) (4 people, 9.5%).

Table 3: Distribution of Respondents by Gender in the Internal Medicine

Internal Medicine and Outpatient Internal Medicine at Daya General Hospital, Makassar City, 2013

Gender	f	%
Male	18	42.9
Female	24	57.1
Total	42	100.0

Source: Primary data, January 2013

Based on Table 3, it can be interpreted that the majority of respondents were female, namely 24 people (57.1%), whilst the remainder were male, 18 people (42.9%).

Table 4: Distribution of Respondents Based on Health Education for Patients in the Internal Medicine Ward and Outpatient Department of Daya General Hospital, Makassar City, 2013

Health Education	f	%
Ever	33	78.6
Never	9	21.4
Total	42	100

Source: Primary data, January 2013

Table 4 shows that the largest group of respondents were those who had received health education, numbering 33 (78.6%), whilst those who had never received health education numbered 9 (21.4%).

Table 5: Distribution of Respondents Based on Experience in Treating of Diabetes Mellitus in the Inpatient Ward and Outpatient Department of Daya General Hospital, Makassar City, 2013

Experience of Inpatient Care/Outpatient Treatment	f	%
Sufficient	36	85.7
Poor	6	14.3
Total	42	100

Source: Primary data, January 2013

Table 5 shows that the highest proportion of respondents were those with sufficient treatment experience (36, 85.7%), whilst the lowest proportion were those with insufficient treatment experience (6, 14.3%).

Table 6: Distribution Based on Patients' Knowledge of Complications

Diabetes Mellitus in the Medical Ward and Outpatient Department of Daya General Hospital, Makassar, 2013

Patients' Knowledge of Diabetes Mellitus Complications	f	%
Sufficient	35	83.3
Insufficient	7	16.7
Total	42	100

Primary data source: January 2013

Table 6 shows that the highest proportion of respondents were those with adequate knowledge of the complications of diabetes mellitus ( ), numbering 35 (83.3%), whilst the lowest proportion were those with insufficient knowledge, numbering 7 (16.7%).

Results of Bivariate Analysis

Bivariate analysis was conducted to examine the relationship between health education and hospitalisation experience with patients' knowledge of diabetes mellitus complications, using the *Chi-Square* test with *Fisher's Exact Test* at a significance level of $\alpha = 0.05$, as shown below:

The relationship between health education and patients' knowledge of diabetes mellitus complications at Daya General Hospital, Makassar.

Table 7: Relationship between health education and patients' knowledge regarding complications of diabetes mellitus in the Internal Medicine Ward and Outpatient Department of Daya General Hospital, Makassar City, 2013

Health education	**Patients' knowledge of DM complications**				**Total**	
	Adequate		**Poor**			
	f	**%**	**f**	**%**	**f**	**%**
Ever	31	73.8	2	4.8	33	78.6
Never	4	9.5	5	11.9	9	21.4
Total	**35**	**83.3**	**7**	**16.7**	**42**	**100** **ρ=0.003**

Source: primary data, January 2013

The research findings show that of the 33 (78.6%) respondents who had received health education, 31 (73.8%) had adequate knowledge, whilst 2 (4.8%) of those who had received health education had insufficient knowledge regarding the complications of diabetes mellitus.

Meanwhile, of the 9 (21.4%) respondents who had never received health education, 5 (11.9%) had insufficient knowledge, whilst 4 (9.5%) had adequate knowledge.

Based on the *Chi-Square* test with *Fisher's Exact test*, a p-value of 0.003 was obtained, which is smaller than the α-value of 0.05. This indicates that the research results are statistically significant; consequently, the alternative hypothesis (Ha) is accepted, meaning there is a relationship between health education and patients' knowledge of diabetes mellitus complications.

- Relationship between hospitalisation experience and patients' knowledge of diabetes mellitus complications at Daya General Hospital, Makassar

Table 8: Relationship between length of hospital stay and patients' knowledge of diabetes mellitus complications in the Internal Medicine Ward and Outpatient Department of Daya General Hospital, Makassar

Length of stay	**Patients' knowledge of DM complications**				**Total**	
	Sufficient		**Poor**			
	f	**%**	**f**	**%**	**F**	**%**
Fair	33	78.6	3	7.1	36	85.7
Poor	2	4.8	4	9.5	6	14.3
Total	**35**	**83.3**	**7**	**16.7**	**42**	**100**
						ρ=0.004

Primary data source: January 2013

The results of the study show that of the 36 (85.7%) respondents with sufficient care experience, 33 (78.6%) had sufficient knowledge of diabetes mellitus complications, whilst 3 (7.1%) respondents with sufficient care experience had insufficient knowledge of diabetes mellitus complications.

Meanwhile, of the 6 (14.3%) respondents with limited clinical experience and insufficient knowledge of diabetes mellitus complications, 4 (9.5%) had limited clinical experience and insufficient knowledge of diabetes mellitus complications, whilst 2 (4.8%) had limited clinical experience but adequate knowledge of diabetes mellitus complications.

Based on the *Chi-square* test with *Fisher's exact test*, a p-value of 0.004 was obtained, which is smaller than the α-value of 0.05. This indicates that the research results are statistically significant; consequently, the alternative hypothesis (Ha) is accepted, meaning there is a relationship between nursing experience and patients' knowledge of diabetes mellitus complications.

Discussion

- The relationship between health education and patients' knowledge of diabetes mellitus complications

The study results show that of the 33 (78.6%) respondents who had received health education, 31 (73.8%) had adequate knowledge of diabetes mellitus complications, whilst only 2 (4.8%) had insufficient knowledge. Meanwhile, based on the *Chi-Square* test with *Fisher's Exact test,* a p-value of 0.003 was obtained, which is smaller than the α-value of 0.05. From this analysis, it can be concluded that the research results are significant; thus, the alternative hypothesis (Ha) is accepted, meaning there is a relationship between health education and patients' knowledge of diabetes mellitus complications

This indicates that with adequate health education, patients' knowledge of diabetes mellitus complications will improve, as health education is an essential component of nursing care and is directed towards activities aimed at improving, maintaining, and restoring health status, preventing disease, and helping individuals to cope with the residual effects of illness. These findings are also supported by a study by M. Khadafi (2011), titled 'The Effect of Health Education on the Knowledge and Attitudes of Type II Diabetes Mellitus Patients at the Endocrinology Outpatient Clinic, Dr. Wahidin Sudirohusodo General Hospital, Makassar', which stated that there is a significant effect of health education on improving patients' knowledge regarding the diet for type II diabetes mellitus. It is hoped that the knowledge gained will have a positive impact on changes in patient behaviour, as knowledge is a process of change from ignorance to awareness.

According to Skinner, the relationship between stimulus and response occurs through interaction with the environment, which subsequently leads to behavioural change. This implies that health education, acting as a stimulus, will elicit a response in the form of a learning process or understanding of a particular issue, which will ultimately influence changes in patients' attitudes and behaviour.

Health education/counselling plays a significant role and has a major influence on an individual's knowledge, as health education activities are conducted by disseminating messages and instilling beliefs so that the community is not only aware, informed and understands, but is also willing and able to implement recommendations related to their health or the illness they are suffering from (Notoatmodjo, 2007).

Meanwhile, of the 9 (21.4%) respondents who had never received health education, 5 (11.9%) had insufficient knowledge; however, 4 (9.5%) of those who had never received health

education still possessed adequate knowledge regarding the complications of diabetes mellitus This is because health education is not only obtained through health education sessions delivered by health workers but can also be acquired from various sources, such as the mass media, both print and electronic. Meanwhile, there were 2 respondents (4.8%) who had received health education but had insufficient knowledge regarding the complications of diabetes mellitus This is due to several characteristics of the respondents that may influence the success of health education, including a low level of education—some having only completed primary school and others having never attended school—and the age of the respondents, with some being 60 years old. This naturally affects the patients' level of comprehension, particularly regarding the reception of information or health education.

Based on the above data, the researcher assumes that patients who have received health education on the complications of diabetes mellitus possess sufficient knowledge compared to those who have never received such education. This is understandable, as knowledge serves as the foundation and motivation for a person to act.

- The relationship between hospitalisation experience and patients' knowledge of diabetes mellitus complications.

The results of the study show that of the 36 (85.7%) respondents who had sufficient experience of care, 33 (78.6%) had sufficient knowledge of the complications of diabetes mellitus, whilst only 3 (7.1%) had insufficient knowledge. Meanwhile, based on the *Chi-square* test with *Fisher's exact test,* a p-value of 0.004 was obtained, which is smaller than the α-value of 0.05. From this analysis, it can be concluded that the research results are significant; thus, the alternative hypothesis (Ha) is accepted, meaning there is a relationship between treatment experience and patients' knowledge of diabetes mellitus complications.

This indicates that with sufficient outpatient treatment experience, patients' knowledge of diabetes mellitus complications will improve, where experience is a learning process that can alter behaviour and is viewed as a process bridging behaviour and action as an intervention variable between specific experiences and behavioural change.

These findings are supported by research conducted by Husen, 2010, entitled 'The relationship between inpatient experience and clients' knowledge of asthma triggers in the Internal Medicine Ward and Pulmonary Outpatient Clinic at the Dr. Wahidin Sudirohusodo General Hospital, Makassar', which concluded that there is a relationship between inpatient experience and patients' knowledge of asthma triggers.

Based on the research findings, there were 3 (7.1%) respondents who had sufficient hospitalisation experience but lacked knowledge regarding complications of diabetes mellitus; this occurred due to a lack of attention to the complications that may arise in patients with diabetes mellitus, which can lead to an increase in the severity of the disease; this may also be linked to the respondents' low educational level. There were also 2 (4.8%) respondents who had limited hospitalisation experience but good knowledge of diabetes mellitus complications; this is because experience is not the sole factor that can enhance a person's knowledge, but may also be influenced by other factors such as health education or counselling.

Based on the above data, the researcher assumes that patients with sufficient hospitalisation experience have adequate knowledge of diabetes mellitus complications compared to patients with limited hospitalisation experience. This is because experience is something that can enrich a person's mind and spirit, and can therefore also be used as a reference for understanding current situations.

The dependent variable that most significantly influences patients' knowledge of diabetes mellitus complications is hospitalisation experience; a statistical test using Fisher's exact test yielded a p-value of 0.004, whilst health education yielded a p-value of 0.003. This can be understood as experience constitutes the conclusion of events previously experienced through the five senses—particularly sight and hearing—which can be stored as memory and frequently used as a reference for current events; experience also leaves a deeper impression on an individual because it is experienced directly, so the more frequently one is exposed to a particular matter, the better the experience regarding that matter becomes, leading to a process of learning and increased knowledge, which ultimately results in a positive change in the patient's behaviour. However, another factor that requires attention is the varying characteristics of the respondents themselves regarding their ability to absorb information.

Conclusion and Results

Conclusion

Based on the research findings and data analysis of 42 respondents regarding the relationship between health education and hospitalisation experience with patients' knowledge of diabetes mellitus complications at Daya General Hospital, Makassar, in 2013, the following conclusions can be drawn:

1. There is a relationship between health education and patients' knowledge of diabetes mellitus complications.
2. There is a relationship between hospital experience and patients' knowledge of diabetes mellitus complications.

Recommendations

1. Healthcare workers should continue to promote health education/counselling for patients regarding their condition and the complications that may arise.
2. It is hoped that Daya General Hospital, Makassar, will continuously improve the quality of its human resources, particularly its nursing staff.
3. It is hoped that this research will be of use to other researchers in the future, enabling them to build upon and explore the subject further, and that it may serve as a useful resource for further research.

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