Patients’ characteristics and their adherence to insulin therapy

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Patients' characteristics and their adherence to insulin therapy

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Abstract:
Background: The prevalence of type 2 diabetes mellitus (DMT2) in Indonesia increased significantly from 6.9% (2013) to 8.5% (2018), putting Indonesia in top six countries in the world with maximum DMT2 patients. Patients with uncontrolled DMT2 are at risk for complications. As such, insulin is often administered to keep the levels under control. Unfortunately, poor adherence to insulin therapy is common, reflecting some factors that may affect the therapy. The aim of this study was to identify and analyze the characteristics of patients contributing to adherence to insulin therapy among DMT2 outpatients using the Health Belief Model (HBM) approach.
Methods: A cross-sectional survey was conducted on a sample of 84 DMT2 outpatients in a private hospital in Surabaya between April and May 2019. Respondents were selected using the accidental sampling technique. Data were analyzed using descriptive analysis and chi-square.
Results: The level of respondents' adherence was high (73.8%). There was no significant relationship between sex, age, level of education, occupation, and duration of use and patient adherence. Using the HBM approach, this study showed a significant relationship between the five components of HBM (perceived susceptibility, perceived severity, perceived benefit, perceived barrier and perceived self-efficacy) and patient adherence.
Conclusions: Patient adherence was influenced primarily by patient belief to the therapy of insulin. The characteristics of patients had no effect on adherence, yet further research is recommended to examine such adherence to a different population.

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Introduction

Diabetes mellitus (DM) is a metabolic disease characterized by hyperglycemia resulting from impaired insulin secretion, insulin action or both [1]. Type 2 DM (DMT2) is a global problem as the incidence continues to increase. Globally, there were 415 million people diagnosed with DM in 2015, and the number is estimated to increase to 642 million people in 2040 [2]. The prevalence of DMT2 in Indonesia increased significantly from 6.9% (2013) to 8.5% (2018), which places Indonesia in the top six countries in the world with maximum DMT2 patients [2]. In 2018, there were 26,441 DMT2 outpatients reported using insulin [3]. This number highlights the potential failure of DM therapy in patients using insulin since the incidence of non-adherence in these patients reached 75% [4].

Insulin is often prescribed to DM type 1 patients. However, insulin can also be an option for treating DMT2 patients with persistent symptoms of polyuria, polydipsia, polyphagia and weight loss [5]. The function of insulin is to convert blood sugar into energy; therefore, insulin is the effective therapy for lowering blood sugar in DM patients [4]. DMT2 patients with poor condition increasingly use insulin therapy [6].

The increasing number of DMT2 patients who use insulin, allows new problems arising about using them independently and appropriately. In fact, using insulin is indeed a new experience for DMT2 patients as they often use oral antidiabetics for medication. Inappropriate self-administration of insulin may cause therapeutic target in DMT2 not being achieved [7]. Self-administration of insulin injection in principle is a complex mechanism as it involves a number of internal and external factors from and beyond the patient-self particularly for outpatients who are unfamiliar to administration of insulin injection. However, the internal values such as beliefs, motivation and awareness are claimed to play more prominent roles in shaping the success of applying new medication including insulin injection for DMT2 patients, leading to high rate for adherence [8].

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The Health Belief Model (HBM) approach offers a theoretical concept of how to determine the success of adherence by measuring the five internal components of belief: perceived susceptibility (patient beliefs towards risk of side effects), perceived severity (patient beliefs towards risk of severity of disease), perceived benefit (patient beliefs towards benefits from the treatment), perceived self-efficacy (patient beliefs towards self-administration of medication) and perceived barriers (patient beliefs towards barriers on using the medication). Since its conception in 1950, HBM has been widely used in many studies to examine patients' behavior [9]. The five components of HBM provided a focus on understanding active behavior of patients. These constructs are important to explain why people will take actions to prevent, cure and control their illness conditions. Therefore, this study aimed to identify and analyze the characteristics of patients affecting adherence to insulin in DMT2 outpatients using the HBM approach.

Materials and methods

A cross-sectional survey was conducted in a private hospital in Surabaya from April to May 2019. The survey was administered to a sample of 84 DMT2 outpatients. Respondents were selected accidentally by considering the following inclusion criteria: DMT2 patients aged ≥18 years, DMT2 patients using insulin for at least 3 months and DMT2 patients who received single insulin therapy or in combination with oral antidiabetics. On the other hand, the exclusion criteria include DMT2 patients who could not read and write the questionnaire, DMT2 patients who received only oral antidiabetics in their recent therapy and patients who refused to participate in the study.

A questionnaire was used as the instrument to collect information about patient evaluation of a number of factors affecting their insulin therapy. The questionnaire combined and subsequently modified the questionnaire of Given et al. [10] and Van der Ven and Ceder's self-efficacy questionnaire [11]. The modification was limited to wording selection to make it more user-friendly. Prior to data collection, the questionnaire was validity and reliability tested to DMT2 outpatients in the selected hospital settings. Thirty patients participated in this testing, which resulted in minor modifications such as layout and change of wording.

The questions about tendency towards HBM factors used the Likert scale (5: strongly agree, 4: agree, 3: doubtful, 2: disagree, 1: strongly disagree), while the questions about adherence used with the Likert scale [12] (5: always, 4: often, 3: sometimes, 2: rarely, 1: never). The questions about adherence were explained elsewhere. In the thesis research, all HBM factors have a positive influence on compliance, and only perceive a barrier that has a negative relationship with compliance. Data were analyzed using a multiple linear regression test and chi-square for measuring the significance of HBM factors, e.g. perceived susceptibility, perceived severity, perceived benefit, perceived barrier and perceived self-efficacy of DMT2 patients with patient adherence.

Results

Characteristics of research respondents are presented in Table 1.

Table 1: Characteristics of respondents (n = 84).

Characteristics	Total (%)
Sex	
Male	41 (48.8%)
Female	43 (51.2%)
Total	84 (100%)
Age, years	
31–40	5 (6.0%)
41–50	9 (10.7%)
51–60	29 (34.5%)
>60	41 (48.8%)
Total	84 (100%)
Education	
Primary school	9 (10.7%)
Junior high school	13 (15.5%)
Senior high school	36 (42.9%)
Diploma	2 (2.4%)

Undergraduate	22 (26.4%)
Postgraduate	2 (2.4%)
Total	84 (100%)
Occupation	
Housewife	24 (28.6%)
State-owned enterprise worker	1 (1.2%)
Retirees	31 (36.9%)
Civil servant	2 (2.4%)
Private sector	20 (23.8%)
Jobless	1 (1.2%)
Entrepreneur	5 (6.0%)
Total	84 (100%)
Duration of using insulin, years	
<1	24 (28.6%)
1–5	33 (39.3%)
6–10	19 (22.6%)
>10	8 (9.5%)
Total	84 (100%)

The number of female patients was slightly higher (51.2%) than male patients (48.8%). Most respondents were over 60 years of age (48.8%) and had been in their retirement (36.9%). Majority of respondents used insulin for 1 to 5 years (39.3%)

The relationship between several characteristics of respondents and adherence to insulin use can be seen in Table 2

Table 2: Chi-square test results of the characteristics of patients .

Patients' characteristics	Score	p-Value
Sex	0.392	0.531
Age	0.210	0.976
Education	8.963	0.111
Occupation	9.782	0.134
Duration of insulin use	0.964	0.810
Source of fund	0.74	0.856

Tabel 2 shows that some of respondents' characteristics, namely gender ($p = 0.531$), age ($p = 0.976$), education ($p = 0.111$), occupation ($p = 0.134$), duration of insulin use ($p = 0.810$) and source of cost ($p = 0.856$), had no significant relationship ($p > 0.05$) with adherence to insulin use.dd a table footnote here

The results of the chi-square test of each HBM variable, can be seen in Table 3.

Table 3: HBM chi-square test results variable.

HBM factor	Score	p-Value
Perceived susceptibility	28.541	<0.005
Perceived severity	28.178	<0.005
Perceived benefit	25.230	<0.005
Perceived barrier	22.422	<0.005
Perceived self-efficacy	15.280	<0.005

The results of the analysis of adherence factors showed that perceived susceptibility, perceived severity, perceived benefit, perceived barrier and perceived self-efficacy had a significant relationship ($p < 0.05$) with patient adherence

The proportion of respondents answer towards the likelihood of events when using insulin injection independently under the five HBM components, can be seen in Table 4

Table 4: Descriptive results of the HBM factor (n = 84).

	Low	Medium	High	Total
Perceived susceptibility	1 (1.2%)	39 (46.4%)	44 (52.4%)	84 (100%)
Perceived severity	1 (1.2%)	16 (19%)	67 (79.8%)	84 (100%)

Perceived benefit	7 (18.3%)	25 (29.8%)	52 (61.9%)	84 (100%)
Perceived barrier	54 (64.3%)	30 (35.7%)	0	84 (100%)
Perceived self-efficacy	1 (1.2%)	17 (20.2%)	66 (78.6%)	84 (100%)

Table 4 shows the proportion of respondents answer towards the likelihood of events when using insulin injection independently under the five HBM components. The high proportion for perceived susceptibility (52.4%) means that patients are well aware of the risk of side effects if they do not use insulin. The high proportion of perceived severity (79.8%) means that patients have high confidence that there can be a risk of severity if they do not use insulin properly. The high proportion of perceived benefit (61.9%) means that patients have confidence that they will get great benefits if they use insulin properly. The high proportion of perceived self-efficacy (78.6%) means that patients have high confidence in being able to make the correct insulin injection. In contrast to the previous four components, the low proportion of perceived barriers (64.3%) means that patients have a small obstacle in carrying out compliance in using insulin properly.dd a table footnote here

Discussions

The aim of this study was to identify and analyze patients' characteristics affecting adherence in DMT2 outpatients using the HBM approach. This study expressed that the prevalence of DMT2 in female patients was slightly higher than the male patients, confirming the latest Indonesian Basic Health Research of 2018 results that nationally female patients are more prone to DMT2 than male patients [3], [13]. One of the rational explanations is that women physiological function tends to store or is slow to dissolve fat particularly when they are in the state of menopause. In combination with infrequent exercise, these two are the prominent causes for metabolic disorders, leading to DMT2 12, [14].

In terms of social determinant for health, educational level plays an important role in shaping someone's awareness, understanding and behavior about health and diseases including in DMT2. The majority of respondents were only graduated from the secondary school level which may put them under a risk of health illiteracy. A study by Restuning [15] showed a similar result that the majority of DMT2 patients in Indonesia only had secondary school education. It is without a doubt that education influences the learning process associated with changing attitude of a person. The higher one's education, the greater the chance for him or her to easily receive information [16]. Using insulin independently is not always an easy task even for experienced ones. Therefore, providing respondents with a practical experience may help them to be more aware of their insulin therapy. In addition, respondents have used insulin continuously for 1 to 5 years, making the provision of such experience even more important in the context of this study.

However, this study revealed that patient characteristics, namely age, sex, education, occupation and duration of using insulin, did not have a significant relationship with adherence to using insulin correctly. This study is in line with the findings of the Rasdiana study which showed no significant relationship between patient characteristics and adherence [17].

This study identified that four components of HBM, namely perceived susceptibility, perceived severity, perceived benefits and perceived self-efficacy, showed high proportion of patients' perception. This is not surprising as each of these four components determined patients' belief towards issues affecting their health. For example, perceived susceptibility in this research represented patients' belief towards the risk of side effect when using insulin injection. The larger proportion reflects larger belief about the risk [18]. When a patient learns to use insulin for the first time, instinctively he or she gathers all facts and stories including the risk of using insulin. Such feelings of vulnerability about the treatment may then trigger patient awareness towards compliance and the importance of administering insulin appropriately. Even if a patient uses medication properly, he or she also has a possibility to experience the side effect of using insulin. Therefore, awareness and subsequently experience has an important role in determining the success of the therapy [16]. Accordingly, perceived severity, perceived benefits and perceived self-efficacy represented patients' belief towards severity of the illness, benefits obtained from the treatment and their ability of using insulin independently, respectively. In relation to insulin use, the higher the proportion of these perceptions, the more likely the patients comply with the treatment.

The last HBM component, i.e. perceived barriers, gained a low proportion of perceptions as it is the sole factor representing patients' belief towards any barriers using insulin. The smaller the proportion highlighted the smaller barriers would be faced by the patients in the treatment. Perceived barriers have an important role in determining behavior change in individuals [19]. It is without a doubt that patients particularly new to insulin treatment are likely to encounter a number of barriers affecting their compliance. These barriers can be internal (individual-related) or external (environment-related) barriers. Internal barriers include feelings of scare when using injection, inconvenience for self-injection and patients' poor understanding about the treatment. On the other hand, external barriers may comprise issues such as lack of insulin product, lack of information from

health care providers and lack of support from the carers or family. The inability of pharmacists, carers or any health professionals in identifying these barriers increases the chance of non-compliance.

Therefore, this study recommended that the hospital or government in a broader scope pay attention to the five components of the HBM model. For instance, provision of information about using insulin independently and appropriately is vital. Despite ideally positioned to perform such a task, pharmacists can also play an important role in advocating and empowering patients and their carers to use insulin confidently. Regular group meetings between DMT2 patients and doctors or pharmacists as the facilitator can be another approach to improve patient compliance; policies must also consider micro and macro factors from a pharmaceutical perspective so that they can make significant changes. Conducting a workshop in a hospital and home visits have been proved to increase patient compliance [20].

Conclusions

Patient adherence to using insulin is influenced by the belief in vulnerability, severity, benefits, barriers and self-confidence. In this study, patient characteristics had no effect on adherence to insulin use. However, further research is needed to prove the consistency of these results in a wider sample.

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