Factors influencing poor oral drug compliance among patients with Diabetes Mellitus

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Abstract
Diabetes Mellitus is a growing public health problem worldwide as well as in Sri Lanka. Most individuals are likely to face barriers in take care of Diabetes Mellitus which is adhering to drug compliance. Poor compliance may associate with several factors. Numbers of patients with Diabetic Mellitus were high in Batticaloa district. Therefore it was essential to conduct a study among diabetic patients to assess the factors influencing on poor drug compliance. A cross sectional study was conducted among 150 Diabetic Mellitus patients in the Diabetic Clinic at the Teaching Hospital, Batticaloa. Patients, above 35 years and who presented the clinic during data collection were included in this study. Data were collected by using an interviewer administered questionnaire. Pre-test was conducted. Data were analyzed to assess the influencing factors of poor drug compliance. Among the respondents 57.3 % (n=86) were females; 42.7 % (n=64) were diagnosed with diabetic mellitus for 1 to 5 years; 68% (n=102) were reported that the reason for skipping medication is fear of side effects; 38% (n=57) were not attending the clinic due to their work schedule; 31.3 %(n=47) were not taking drugs because of forgetting. Rate of poor oral anti diabetic drugs compliance of patients in Batticoloa district was high. Level of education played an important role in poor adherence to medical advice. Patients should be encouraged to use anti diabetic drugs and regular awareness should be created regarding the benefits of using them to prevent the intentional poor oral drugs compliance.

Keywords: diabetes mellitus, patients, medications, compliance

1. Introduction
Diabetes Mellitus has become one of the most common non communicable disease, characterized by hyperglycemia with disturbances of carbohydrates, fat and protein metabolism resulting from defects in insulin secretion, insulin action or both [1]. Diabetes Mellitus has potential for serious complication and often results in significant financial burden, decreased quality of life and major lifestyle changes of patients and their families [2].Diabetes Mellitus is a growing public health problem worldwide with an estimation of 221 million by 2010 and it is expected to rise to 300 million in 2025 with biggest increases in Asia [3]. Sri Lanka is currently experiencing an epidemic of diabetes mellitus as a result of the epidemiologic and demographic transitions [4].
Most individuals are likely to face barriers in take care of Diabetes Mellitus which is adhering to drug compliance [5]. Poor oral drug compliance is defined as "reliability of the patient in using a prescribed medication exactly as ordered by the physician". Noncompliance occurs when a patient forgets or neglects to take the prescribed dosages at the recommended times or decides to discontinue the drug without consulting the physician. Poor compliance may associated with patient-centered factors which are demographic (age, gender, educational level, and marital status) and psychological (patients beliefs and motivation towards the therapy, negative attitude, patient-prescriber relationship, understanding of health issues, and patients knowledge) [6], therapy related factors which are route of medication, duration of treatment, complexity of treatment, type of medication and the side effects of the medicines and healthcare system related factors such as availability and accessibility of health care, and the health provider-patient interactions [7].

The prevalence of diabetes mellitus is growing rapidly and is reaching epidemic proportions worldwide as well as in Sri Lanka. Non-compliance to prescribed medication has been a major problem. As per the reference of clinic register of Teaching Hospital Batticaloa, nearly three hundred patients attend to the medical clinic per month and there are two medical clinics per week. Numbers of patients with diabetic mellitus are comparatively higher than other non-communicable diseases. Therefore it was essential to conduct a study among diabetic patients to assess the factors affecting poor compliance toward therapeutic management in the aspect of oral drug intake. The purpose of this study is to identify the personal factors, socio –economic factors and health related factors which are influencing poor oral drug compliance among patient with diabetic who are visiting to the medical clinic at Teaching Hospital, Batticaloa. Through this study appropriate guide interventions will be done for improving drug compliance and for maintaining optimal glycaemic control among patients with diabetes in Batticaloa area.

2. Materials and Methods
A descriptive cross sectional study was conducted among patients with Diabetic Mellitus who are attending the Diabetic Clinic Teaching hospital, Batticaloa to identify the factors influencing poor oral drug compliance. This was a quantitative approach. 150 patients who were affected with poor oral drug compliance were selected as respondents by the use of purposive random sampling method. Patients who were above 35 years and who presented the clinic during the period of data collection were included in this study. Patients with confusion and pregnant mothers and respondents of pre-test were excluded from the study. Data were collected by

investigators with the use of structured interviewer administered questionnaire and the clinic records of patients'. Pre-test was conducted and the questionnaire was modified and reframed to ensure validity. Data were analyzed by using SPSS 19 statistical package. Before the data collection participants were thoroughly explained in detail about the purpose of the study, procedures, the risk and benefit of the study and consent was obtained. Voluntary participation was encouraged by providing respect to the human dignity. Participants were informed that they can withdraw at any stage of the study without penalty. Ethical approval was obtained from Ethics Review Committee of Faculty of Health-Care Sciences, Eastern University, Sri Lanka. Permission for data collection was obtained from Director, Teaching Hospital, Batticoloa. All the data were kept confidentially. Anonymity was maintained.

3. Results
3.1 Socio-demographic description of study samples
This study consisted of 150 participants. Among them 57.3 % (n=86) were females; 33.3% (n=50)were in the age group of more than 65 years; 98.7% (n=148) were married;63.3% (n=95) were Tamils; 43.3% (n=65) had education of grade 6 to 10; 90% (n=135) were non-vegetarians; 42.7 % (n=64) were diagnosed with diabetic mellitus for 1 to 5 years;65.3% (n=93) were with no family history of diabetic mellitus; 95.3% (n= 143) were non-smokers; 86.7% (n=130) were non-alcoholic; 48.0% (n=72) were with overweight; 32.7% (n=49) were manual workers (Table 1).

Table 1: Socio demographic distribution of the study population

Variables (n=150)		No.	(%)
Gender	Male	64	42.7
	Female	86	57.3
Age	35-45	9	6
	46-55	32	21.3
	56-65	59	29.3
	>65	50	33.3
Marital status	Single	2	1.3
	Married	148	98.7
	Widowed	0	0
	Separated	0	0
Ethnicity	Sinhalese	0	0
	Tamils	95	63.3
	Muslims	49	32.4
	Others	6	4
Educational Level	Grade 1-5	36	24
	Grade 6-10	65	43.3
	Passed O/L	31	20.7
	Passed A/L	13	8.7
	Diploma/ High Education	5	3.3
Dietary habit	Vegetarian	15	10
	Non Vegetarian	135	90
Initial diagnosis with DM	< 01 year	30	20
	1-5 year	64	42.7
	6-10 year	45	30
	>10 year	11	7.3
Family History of Diabetes	Yes	51	34
	No	98	65.3
	Not known	1	0.7
Smoking	Yes	7	4.7
	No	143	95.3
Alcohol	Yes	20	13.3
	No	130	86.7
Occupation	Manual worker	49	32.7
	Self-employee	28	18.7
	Government Job	33	22
	Un employee	40	60

3.2 Personal factors affecting the drug compliance of the study samples
Fig.1 describes the personnel factors which are influencing the poor oral drug compliance. Among the respondents 68% (n=102) were reported that the reason for skipping medication is fear of side effect of drugs; 3.3% (n=05) were reported the reason as unhappy feeling of drugs and none of them reported the feeling of drug ineffectiveness and feeling of better health as a reason for skipping medications.

3.3 Socio-economic factors as barriers of oral drug compliance
All the respondents of this study were receiving medications in diabetic clinic; 98% (n=148) of participants were not consuming any other indigenous medicine; 38% (n=57) of patients with diabetes mellitus not attending the clinic due to the hard work schedule; 85.3 % (n=128) had taken oral medicines regularly (Table 2).

3.4 Health related factors affecting oral drug compliance

Out of 150 patients 31.3 %(n=47) had not taken the drug, because of forgetting; 29.3 % (n=44) had not taken because of not taking food; 2.0 %(n=3) had not taken medicines because of previous normal FBS and because of sick. (Figure 2).
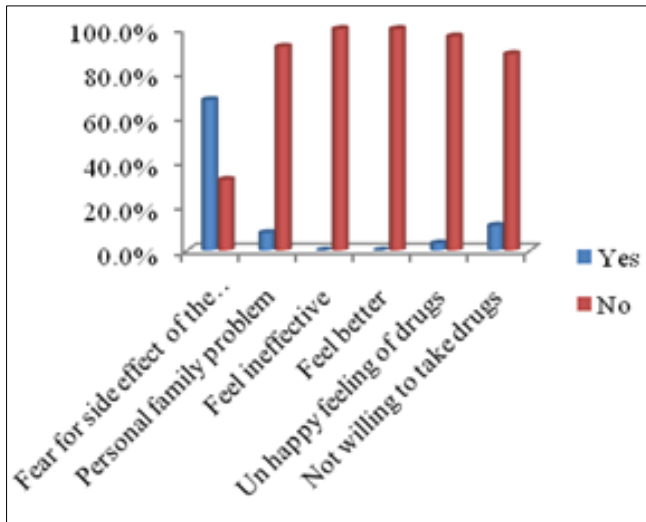

Fig 1: Personal factors affecting the drug compliance of the study sample

Table 2: Socio-economic factors as barriers of oral drug compliance

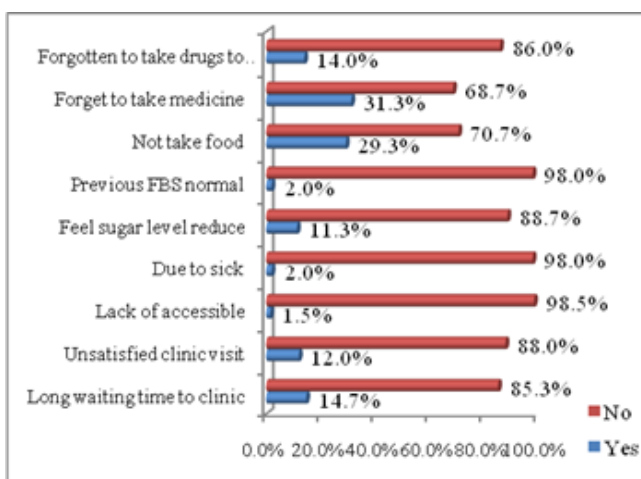| Variable (n=150)	Yes		No	
	No.	%	No.	%
Clinic provide all drugs prescribed	150	(100.0)	-	-
Take any other indigenous drugs	2	(1.3)	148	(98.7)
Life style	127	(84.6)	23	(15.3)
Lack of accessibility for hospital	7	(4.7)	143	(95.3)
Hard work schedule	57	(38.0)	93	(62.0)
Take DM drugs Regularly	128	(85.3)	22	(14.7)
Today taken the dose	99	(66.0)	29	(44.0)
Residual drugs when you come to the clinic	117	(780.)	33	(22.0)

Fig 2: Health related factors affecting oral drug compliance

4. Discussion

This study was performed at Medical clinic, Teaching Hospital, Batticoloa to identify socio demographic, personal, socio economic and health related factors influencing in poor oral drug compliance among both genders, multi ethnic, different age and different educational status patents.

In the current study it was noticed that the age group of (56-65) patients had much poor oral drugs compliance than others. Many studies showed that age was related to compliance, although a few researchers found that age not to be a factor causing non-compliance [8, 9]. Some studies focusing on younger people (mean age 46–50 yr) indicated the same trend that compliance increased with the increasing age [10]. But some studies showed that advancing age affected drug compliance among elderly people in the opposite direction [11, 12]. Another one of supported study stated that low education level of older patients and home-care patients aged 70 and over were less likely to be compliant with their prescribed medication [11].

Ethnicity not impact to poor drug compliance according to the findings of this study. One of supported study said that Caucasians believed some ethnic group have good drug compliance while African-Americans, Hispanics and other minorities were found to have comparatively poor drug compliance [13]. In this research study, majority participants were females and gender not impact poor drug compliance; similar finding was there in another study concluded that gender has not been found to influence compliance [14]. According to the current study, patient with low educational level and passed in (O/L) had much compliance with anti-diabetic drugs. Supported studies found that patients with higher educational level had much drug compliance [11]. Another study showed that patients with lower education level have better compliance [15]. From these results, it seems that educational level may not be a good predictor of therapeutic compliance.

According to our findings marital status influence the drug compliance positively. Some other studies show similar findings [16]. The help and support from a spouse could be the reason why married patients were more compliant to medication than single patients. However, marital status was not found to be related to patient's compliance in some other recent studies [17]. According to the finding, negative belief and motivation of therapy increased poor oral drug compliance in some of the patients. Another similar study showed that patients who had low motivation to change behaviors or take medication were believed to have poor compliance [18]. Poor communication and patient-prescriber relationship is very bad impact on poor oral drugs compliance according to research findings. This finding is similar with one of study which reported that poor communication with healthcare providers also likely to cause a negative effect on patients' compliance [19]. Treatment complexity and long duration of drug usage were lead to poor drug compliance according to current study finding. Similarly another study finding showed that complex treatment is believed to threaten the patients' compliance.

However, compliance does not seem to correlate with the number of drugs prescribed [20], but the number of dosing times every day of all prescribed medications. The rate of compliance decreased as the number of daily doses increased. This is illustrated by one study where compliance was assessed by pill counts and self-reports that showed that poor compliance increased with an increase in the frequency of prescribed dosing [21]. Medication side effect was another reason for poor oral drug compliance according to the current study; another similar study found that side effects threaten patients' compliance [22]. Social and economic factors included time commitment, cost of therapy, income and

social support. According to this study, time commitment mean patient willing to spending time for his disease. 25% of patients much spend time while 60% of patient fairly spending time this commitment directly affect the poor oral drug compliance. This was similar to another study finding which was reported that less time for treatment threatened the compliance [23]. It was found that health care system factors were significantly related to poor oral drugs compliance. According to current findings, lack of accessibility and satisfaction with the healthcare facilities were important contributors to poor compliance. This result is similar to another study which showed that accessibility of healthcare may increase poor drug compliance [11]. Long waiting time for clinic visits and unhappy experience during clinic visits was indicated to irregular clinic followers; Another similar study found that long waiting time for clinic visits will cause irregular clinic visit [24]. According to the findings of this study, difficulty in getting prescriptions was less; but opposite finding was there as more difficulty in getting prescriptions [25], and unhappy or unsatisfied clinic visits [17] all contributed to poor compliance. The above observation is further supported by another study that showed patients' satisfaction with clinic visits is most likely to improve their compliance with the treatment [26]. Disease related and severity of symptoms affected poor oral drug compliance according to the current study. This is similar to another research finding that patients who are suffering from diseases with fluctuation or present of symptoms (at least at the initial phase) have a poor compliance [15, 25].

5. Conclusion
Poor oral drugs compliance is a very common problem in diabetic patients. The management of increase drug compliance is most important task today. The result of this study showed that the rate of poor oral anti diabetic drugs compliance of patients in the Batticoloa region was high. The main reasons for this were some of demographic factors for instance the level of education played an important role in poor adherence to medical advice. The majority of patients who could not see the doctor on the clinic day of appointment mentioned unavailability of transport and forgetfulness as other main reasons. This reveals that there is the need to establish some sort of system by which contact can be made with those patients who have difficulty in attending clinics and medication delivered to them on time.

6. References
1. Sloan FA, Padrón NA, Platt AC. Preferences, Beliefs, and Self-Management of Diabetes. Health Serv Res. 2009; 44(3):1068-1087.
2. Coffey JT, Brandle M, Zhou H, Marriott D, Burke R, Tabaei BP, et al. Valuing health- related quality of life in diabetes. Diabetes Care. 2002; 25:2238-2243.
3. Amos AF, McCarty DJ, Zimmet P. The rising global burden of diabetes and its complications: estimates and projections to the year. Diabet Med. 2010; 14(5):81-85.
4. Ministry of Health. Annual Health Bulletin. www.healthcpc.org/downloads/annual_health_bulletin, 2007.
5. Aljasem LI, Peyrot M, Wissow L, Rubin RR. The impact of barriers and self efficacy on self - care behaviors in type 2 diabetes. The Diabetes Educator. 2001; 27:393-404.
6. Jin J, Sklar GE, Min Sen Oh V, Chuen Li S. Factors affecting therapeutic compliance: A review from the patient's perspective. TherClin Risk Manag. 2008; 4(1):269-86.
7. Pollack MF, Purayidathil FW, Bolge SC, Williams SA. Patient-reported tolerability issues with oral anti-diabetic agents: Associations with adherence; treatment satisfaction and health-related quality of life. Diabetes Res ClinPract. 2009; 87(2):204-10.
8. Wild S, Roglic G, Green A, Sicree R, King H. Global prevalence of diabetes: estimates for the year 2000 and projections for 2030. Diabetes Care. 2004; 27(5):1047-53.
9. Wai CT, Wong ML, Ng S, Cheok A, Tan MH, Chua W, et al. Utility of the Health Belief Model in predicting compliance of screening in patients with chronic hepatitis B. Aliment Pharmaco Ther. 2005; 21:1255-62.
10. Lacasse Y, Archibald H, Ernst P, Boulet LP. Patterns and determinants of compliance with inhaled steroids in adults with asthma. Can Respir J. 2005; 12(4):211-217.
11. Okuno J, Yanagi H, Tomura S. Is cognitive impairment a risk factor for poor compliance among Japanese elderly in the community? Eur J Clin Pharmacol. 2001; 57:589-94.
12. Balbay O, Annakkaya AN, Arbak P. Bilgin C, Erbas M. Which patients are able to adhere to tuberculosis treatment? A study in a rural area in the northwest part of Turkey. Jpn J Infect Dis. 2005; 58:152-8.
13. Monane M, Bohn RL, Gurwitz JH. Compliance with antihypertensive therapy among elderly Medicaid enrollees: the roles of age, gender, and race. Am J Public Health. 1996; 86(12):1805-1808.
14. Manteuffel M, Williams S, Chen W. Influence of patient sex and gender on medication use, adherence, and prescribing alignment with guidelines. J Womens Health. 2014; 23(2):112-9.
15. Kyngas H, Rissanen M. Support as a crucial predictor of good compliance of adolescents with a chronic disease. J Clin Nurs. 2001; 10:767-74.
16. Swett C, Noones J. Factors associated with premature termination from outpatient treatment. Hosp Community Psychiatry. 1989; 40:947-51.
17. Spikmans FJ, Brug J, Doven MM. Why do diabetic patients not attend appointments with their dietitian?. J Hum Nutr Diet. 2003; 16(3):151-8.
18. Lim TO, Ngah BA. The Mentakab hypertension study project. Part II – why do hypertensives drop out of treatment? Singapore Med J. 1991; 32:249-51.
19. Bartlett EE, Grayson M, Barker R Levine D, Golden A, Libber S. The effects of physician communications skills on patient satisfaction; recall, and adherence. J Chronic Dis. 1984; 37(9-10):755-64.
20. Iihara N, Tsukamoto T, Morita S, Miyoshi C, Takabatake K, Kurosaki Y. Beliefs of chronically ill Japanese patients that lead to intentional non-adherence to medication. J Clin Pharm Ther. 2004; 29(5):417-24.
21. Cockburn J, Gibberd RW, Reid AL. Determinants of non-compliance with short term antibiotic regimens. Br Med J. 1987; 295:814-8.
22. Spagnoli A, Ostino G, Borga AD. Drug compliance and unreported drugs in the elderly. J Am GeriatrSoc. 1989; 37:619-24.

23. Hernández-Ronquillo L, Téllez-Zenteno JF, Garduño-Espinoza J, González-Acevez E. Factors associated with therapy noncompliance in type-2 diabetes patients. SaludPublica Mex. 2003; 45:191-197.

24. Balakrishnan R, Rajagopalan R, Camacho FT, Huston SA, Murray FT, Anderson RT. Predictors of medication adherence and associated health care costs in an older population with type 2 diabetes mellitus: a longitudinal cohort study. ClinTher. 2003; 25:2958-71.

25. Vlasnik JJ, Aliotta SL, DeLor B. Medication adherence: factors influencing compliance with prescribed medication plans. Case Manager. 2005; 16:47-51.

26. Haynes, RB, Taylor, DW, Sackett, DL Gibson ES, Bernholz CD, Mukherjee J. Can simple clinical measurements detect patient noncompliance Hypertension. 1980; 2(6):757-64.