O R I G I N A L   P A P E R

Adherence to Medication among Older Israeli Arabs: a Cross-Sectional Study

Merav Ben-Natan, RN, PhD
Manager Director, Pat Matthews Academic School of Nursing, Hillel Yaffe Medical Center, Hadera, Israel
Department of Nursing, School of Health Professions, Tel Aviv University, Tel Aviv, Israel

Omaima Salama, BA, RN
Emergency Unit, Belinson Hospital, Petah Tikva, Israel

Nezar Khalaily, BA RN
Surgical department Rambam, Haifa, Israel

Moshe Adler, BA, RN
Pediatric hematology and Bone Marrow Transplantation, Hadassah University Hospital, Jerusalem, Israel

Corespondence: Merav Ben-Natan, Manager Director, Pat Matthews Academic School of Nursing, Hillel Yaffe Medical Center, Hadera, Israel. E-mail: meraav@hy.health.gov.il

Abstract

Objective.   To identify the factors that affect adherence to medication among older persons aged 65 and older in the Arab sector using an extended Theory of Reasoned Action.
Design, Sample: A Cross-sectional questionnaire survey was conducted among convenience sample of 200 older persons in Israel aged 65 and older from the Israeli Arab sector who use prescription drugs.
Measurments: The questionnaire was prepared by the researchers based on the literature review and the extended research model.
Results. Research findings indicate that 80.5% of respondents fully adhere to medication. Respondents believe that medication is important and must be adhered to and they attribute much significance to the effect of significant others (physician, children) on medication adherence. Moreover, adherence was found to decline with the rise in number of medications. Adherence also rises with lower functioning of respondents, who consequently receive more assistance with daily activities.
Conclusion.   The present study supports the use of an extended psychosocial theory for identifying factors affecting the medication adherence of older Arabs. It is very important to assess older persons' adherence to medication. Reevaluation of the number of medications prescribed, sources of assistance, and guidance for proper administration of medications, should be considered.

Keywords: Adherence; Medication; Older Israeli Arabs; Theory of Reasoned Action**,** Nursing

Background

Older persons in the Western world often take medications. About one quarter of all older persons take at least three prescription drugs a day (Bissonnette, 2008). The term used to describe self-administration of medications prescribed by a doctor is not uniform. Definitions range from "compliance" to "adherence".

Compliance is defined as "the degree to which patient behavior, particularly in the context of medication administration, is compatible with the recommendations of the medical staff"(Osterber & Blaschke, 2005, p 487). This term implies that patients are passive and must obey caregiver instructions. The term "adherence" describes the self-application of medical instructions by

patients (Bissonnette, 2008, p 635). This term implies that decisions regarding medical care are reached jointly by caregiver and patient. Thus, caregivers do not perceive patients as passive, rather as capable of understanding and making decisions, and as taking an active part in resolutions concerning their care (Hassan *et al.*, 2006).

Medication adherence among patients is measured as the proportion of the drug regimen prescribed that is self-administered by patients in the time frame determined by the doctor. Rates of adherence to medication are higher among patients with acute illnesses than among patients with chronic illnesses (Osterber *et al.*, 2005). Patients are considered compliant with medication if they follow medical recommendations and take at least 80% of medications as instructed (Hassan *et al.*, 2006).

Eighty six percent of Israelis aged 66 and older report using prescription drugs. Estimates indicate that over 30% of medications prescribed for older persons by physicians in Israel are not taken according to instructions (Central Bureau of Statistics, 2010). Thus, medications do not achieve their maximal therapeutic effect and patients' health does not improve and might even deteriorate. Estimates show that about 2,400 people die each year in Israel as a result of incorrect use of medications. Beyond the personal harm to patients, this results in a waste of resources in the entire healthcare system. Illness aggravation due to irregular use of medication leads to frequent visits to the emergency room and unnecessary hospital stays (Central Bureau of Statistics, 2010).

Lack of adherence to medication is a problematic issue and has received much research attention. However, unequivocal predictors of this adherence are still unclear. One theory attempting to predict behavior is the Theory of Reasoned Action devised by Ajzen & Fishbein (1980). Several studies have examined whether this theory manages to predict adherence to medication. Gatti *et al.* (2009), who examined the relationship between patients' beliefs concerning use of medications to treat their illness and compliance with this care through the Theory of Reasoned Action, found that patient beliefs concerning medication affect adherence to treatment. Beliefs found to be influential included lack of confidence in the treatment's

efficacy and in its ability to help improve the situation and cure the illness (Ross *et al.* 2004), as well as the concern of addiction to medication (Gatti *et al.* 2009) and of side effects (Rubin 2005). Another study examining older patients (over 67) with hypercholesterolemia found that patients who believed that high levels of cholesterol might cause heart attacks and stroke demonstrated better adherence to medication (Hughes, 2004).

Mackey & La Greca (2008), who examined the Theory of Reasoned Action in the context of food consumption and physical activity among adolescent girls, found that significant others, e.g. family and friends, are a significant predictor of the performance of preventive health behaviors. Additional support for the decision to use a normative beliefs measure for a subjective norm is provided by an analysis of the Theory of Planned Behavior model, conducted by Armitage & Conner (2001). The correlation between subjective norms and behavioral intentions was found to be significantly weaker than between behavioral intentions and the other constructs. A possible reason for the weakness of subjective norms was its manner of measurement.

In studies that measured subjective norms through a single item the correlation with intentions was weaker than in studies using several items or a measure of normative beliefs. Lack of compliance with adherence to medications might also have to do with the need to take different medications prescribed by multiple caregivers, particularly when respondents have no significant others or when they do not attribute much significance to the opinion of significant others. The problem is particularly conspicuous among older persons, who often suffer from a variety of chronic illnesses and are treated by experts from different fields. A study held among 75 year old patients treated by several different doctors who prescribed different medications found a significant impact on lack of compliance with medications prescribed (Schlenk *et al.*, 2004).

Other factors that might predict medication adherence include the number of medications prescribed, sociodemographic status (with an emphasis on one's economic capabilities), and level of functioning, as a function of the number of chronic illnesses. Studies have shown that the more medications prescribed the lower the

compliance with medications. In a study examining compliance with hypertension medications, patients prescribed two daily hypertension medications were found to demonstrate significantly lower compliance than patients prescribed a regimen of a single daily medication (Farmer *et al.*, 2005).

Another study conducted among patients with a mean age of 75 who were prescribed 3 medications or more a day found that their rate of compliance with this regimen was significantly lower than those prescribed one medication a day (Schlenk *et al.*, 2004).

Yet another study conducted among 857 women aged 65+, Israelis with osteoporosis, found that women required to take more than one type of medication demonstrated lower adherence than women who took only one type of medication (Rasuli, 2008). Sweileh *et al.*, (2009), who examined compliance with medication among 321 Palestinian Arabs with diabetes and hypertension, found that among both the diabetes and the hypertension patients compliance was related to the number of medications prescribed, i.e. the higher the number of medications prescribed the lower the compliance.

In addition, a correlation was found between compliance with medications and the number of times a day patients were required to administer medications, with a high rate of compliance found among patients required to take medications only once a day. In addition to these factors, psychological factors affecting patient compliance with medication were found as well, for example similar medications (with the same shape, size, or color) caused confusion and patients tended to avoid taking them (Sweileh *et al.*, 2009).

People with a higher level of functioning and who had more mild or less illnesses were found to be less compliant with medication. A study conducted among 316 Arabs with hypertension in Egypt found that respondents who reported having an asymptomatic illness which therefore does not interfere with their daily functioning tended to adhere less to treatment (Youssef & Moubarak, 2002).

Another dimension related to medication adherence and typical mainly of older persons is forgetfulness, which constitutes the primary reason for not taking prescribed medications among older persons. In a study conducted among 66 year olds with peripheral vascular disease, 75% of respondents were reported to neglect taking medications regularly due to forgetfulness (Schlenk *et al.*, 2004). Studies show that older persons have more difficulty understanding and remembering medication instructions than younger persons. As a result, they forget how to use medication properly, when to take their medicine, and the purpose of the medicine (Schlenk *et al,.* 2004, DiMatteo *et al.*, 2007).

Researchers have extensively explored the attitudes, beliefs and intentions of older western people that might predict medication adherence. However, there is little in the literature about the attitudes, beliefs and intentions to adherence to medication among older Israeli Arabs.

The Theory of Reasoned Action (TRA), designed by Ajzen and Fishbein (1980), is a psychological theory discussing the effect of people's decisions on their performance of certain behaviors. The theory stems from the premise that humans behave logically and use accessible information systematically. The claim is that people calculate the implications of their behavior before acting. The theory relates to two factors affecting human behavior – human nature and the environment. Personal components consist of one's attitudes towards a behavior, and environmental components are one's perception of pressure exerted by society to perform or refrain from performing the relevant behavior. Another important factor that must be taken into account at this stage is the significance attached to opinions of others regarding the behavior examined. According to the theory, attitudes are formed as a result of beliefs – if a person's beliefs concerning the behavior examined are perceived as positive he/she will have positive attitudes towards the behavior, and vice versa.

The theory constructs, which are interrelated, include behavioral beliefs (respondents' general evaluation, positive or negative, of taking medications.), normative beliefs (respondents' perception of the social pressure applied by significant others regarding taking medication), attitude towards the behavior (respondents' attitudes towards the outcomes of taking medication), subjective norms (respondents' perception of the beliefs held by people of importance to them), and behavior intentions

(respondents' intention to administer or not administer prescribed medications). In addition to the theory variables, the model examines sociodemographic variables, health status, number of medications taken by patients, and assistance with daily activities, as displayed in figure 1.

Aim

Based on an extended Theory of Reasoned Action, the aim of the study was to identify the factors that affect adherence to medication among older persons aged 65+ from the Arab sector.

Methods

Design and Sample

A Cross-Sectional study was conducted among convenience sample of older persons from the Arab sector in Israel, aged 65 and older, who take prescription drugs. Inclusion criteria were: Older Arabs aged 65+, citizens of Israel, who are independent and regularly use prescription drugs, live at home, are non-demented, and read Arabic fluently. Three hundred questionnaires were distributed and 200 fully completed intact questionnaires were returned, for an effective response rate of 66%. The data were collected during 2011. The sample size is deemed sufficient as it is ten times higher than the number of variables introduced in the regression model (Stevens, 2002).

Data collection

After receiving the approval of the ethics committee, the researchers distributed the questionnaire among a convenience sample of respondents at their homes in Arab villages in central Israel. Names of older persons were provided by their families and friends. Assurance was given that the subjects would remain anonymous and that research findings would be used for research purposes only. Subjects' anonymity was assured. An information sheet explaining the purpose and importance of the study was attached to the questionnaire. Each questionnaire took about 30 minutes to complete.

Ethical considerations

Ethics approval was received from the ethics committee of the Academic School of Nursing.

Instrument

The questionnaire was prepared by the researchers based on the literature review and the extended research model. The questionnaire consisted of 62 items in 12 areas. The reliability of the questionnaire was 0.74-0.86 Alpha Cronbach.

Demographic details: This part consists of 5 items on respondents' personal-demographic background, describing the research population (sex, age, schooling, religion, religiosity).

Dependence – independence: This part consisted of 3 items on which respondents were asked to rank their degree of independence. The first question referred to residential settings housing chronic patients, the second to the identity of people who assist respondents, and in the third respondents were asked to describe their level of functioning.

Health status: Examined by 12 items in which respondents were asked to respond to questions on their health status. For example: "How do you define your state of health compared to others your age". Items were ranked on a scale ranging from "Do not agree at all" – 1, to "Agree very much" – 4.

Number of prescription drugs prescribed by a doctor: Examined by one item for which respondents were asked to write a number.

Behavior: Five items examining respondents' former and current medication taking behavior. Sample item: "There have been times when I decided to take a certain medication at a higher dosage than that prescribed". Items were ranked on a scale ranging from "Do not agree at all" – 1, to "Agree very much" – 4.

General reasons for not taking medication: Six items examining respondents' reasons for not taking medications. Sample item: "Fear of side effects". Items were ranked on a scale ranging from "Do not agree at all" – 1, to "Agree very much" – 4.

Behavioral intentions: Three items examining respondents' intention to administer or not administer prescribed medications. Sample item: "I intend to take only those medications that do not result in side effects". Items were ranked on a scale ranging from "Do not agree at all" – 1, to "Agree very much" – 4.

Barriers to taking medications: Twelve items examining barriers encountered by respondents

when taking medications. Sample item: "I don't take my medication because I have difficulty splitting the tablets in half". Items were ranked on a scale ranging from "Do not agree at all" – 1, to "Agree very much" – 4.

Behavioral beliefs: Seven items examining respondents' general evaluation, positive or negative, of taking medications. Sample item: "The harm caused by medications is greater than their benefit". Items were ranked on a scale ranging from "Do not agree at all" – 1, to "Agree very much" – 4.

Behavioral attitudes: Two items examining respondents' attitudes towards the outcomes of taking medication. Sample item: "Taking medication will prolong my life". Items were ranked on a scale ranging from "Do not agree at all" – 1, to "Agree very much" – 4.

Normative beliefs: Three items examining respondents' perception of the social pressure applied by significant others regarding taking medication. Sample item: "My spouse encourages me to take my medications regularly". Items were ranked on a scale ranging from "Do not agree at all" – 1, to "Agree very much" – 4.

Subjective norms: Three items examining respondents' perception of the beliefs held by people of importance to them. Sample item: "My children's opinions about taking medication are very important to me". Items were ranked on a scale ranging from "Do not agree at all" – 1, to "Agree very much" – 4.

Data analysis

Data analysis was performed with the Statistical Package for Social Sciences (SPSS-PC 19). Descriptive statistics were used to depict the demographic characteristics of the sample and responses to the TRA and its subscales. Means and standard deviations (SD) of responses were calculated. Pearson correlations, one-way ANOVA, χ^2 were used to determine the relationship between the research variables. Finally, linear regression was performed to examine prediction by the theoretical model.

Validity and reliability

A group of four experts examined the face validity of the questionnaire. The questionnaire was translated into Arabic and back into Hebrew to examine its external validity. The questionnaire was validated by 3 nurses and 3 doctors, content experts in old age and medication, followed by a pilot study to examine questionnaire reliability among 30 older Arabs. The internal consistency of the questionnaire constructs was assessed using Alpha Cronbach coefficients.

Results

Sociodemographic characteristics

Sociodemographic data on respondents is presented in detail in table 1. Regarding health status, 44.5% (n=89) defined their state of health as reasonable, while 31.5% (n=63) defined their state of health as bad. Health problems common among respondents were: depression 73.5% (n=147), 57.5% (n=115) suffered from hearing problems, 55.5% (n=111) suffered from hand tremors, 53% (n=106) suffered from heart disease, 50.3% (n=100) suffered from vision problems. The mean number of medications taken by respondents was 5.09 (SD=2.91), with a range of 0-20.

Behavior and intentions

Of all respondents, 80.5% (n=161) took all medications prescribed by their doctor and intended to continue taking them; only 4.5% (n=9) didn't take all medications prescribed. Ninety percent (n=180) never decided to take higher dosages than those prescribed. Eighty nine percent (n=178) didn't agree with the statement "Sometimes I skip prescribed medication doses". Fifty percent (n=100) agreed with the statement "Sometimes I take medications at different times than those prescribed". Fifty two percent (n=104) agreed that forgetfulness is a reason for not taking medication. A smaller quantity of medications would facilitate compliance with taking medication in the opinion of 67.8% (n=135). Of all respondents, 51.8% (n=103) highly concurred that when they were in a bad mood they didn't take their medication. Significant elements that influenced respondents' willingness to adhere to medication were their physician and family members (80% for each).

Inferential statistics

Table 2 shows that all the research variables have a normal distribution. Moreover, the table shows that perception of all variables is moderate, with the exception of behavior for which a lower mean was found.

Table 1. Descriptive statistics of sociodemographic and health-related data

Variable	Categories	N	%
Sex	Male	86	43
	Female	114	57
Age	65-74	108	54
	75-84	77	38.5
	85 or older	15	7.5
Religion	Muslim	164	82
	Druze	1	0.5
	Christian	35	17.5
Religiosity	Religious	121	60.5
	Traditional	72	36
	Secular	7	3.5
Schooling	Elementary	59	35.3
	Secondary	37	22.1
	Vocational	56	33.5
Living arrangements	Lives alone	66	33
	Lives with spouse	59	29.5
	Lives with family	70	35
	Lives with caregiver	5	2.5
Daily help	Spouse	48	24
	Children	36	18
	Extended family	58	29
	Caregiver	14	7
	Manages on own	44	22
Level of functioning	Independent	46	23
	Needs a little assistance	56	28
	Needs a lot of assistance	61	30.5
	Needs constant assistance	37	18.5

Table 2. Mean and standard deviations of main model variables (N=200)

Variable	Mean	Median	SD	Range
Behavioral beliefs	2.2	2.2	0.3	1-4
Behavioral attitudes	2.0	2.1	0.5	1-4
Normative beliefs	2.4	2.3	0.4	1-4
Subjective norms	2.3	2.3	0.2	1-4
Behavioral intentions	2.2	2.1	0.5	1-4
Behavior	1.6	1.6	0.4	1-4

Table 3. Pearson correlation for Theory of Reasoned Action Constructs

	Behavioral attitudes	Normative beliefs	Subjective norms	Behavioral intentions	Behavior
Behavioral beliefs	0.39	0.18	0.40	0.22	0.37
p	0.01	0.01	0.01	0.01	0.01
Behavioral attitudes	-	0.11	0.17	0.32	0.20
p		0.21	0.07	0.01	0.32
Normative beliefs	-	-	0.66	0.02	0.03
p			0.01		
Subjective norms	-	-	-	0.54	0.34
p				0.02	0.01
Behavioral intentions	-	-	-	-	0.23
p					0.01

The findings depicted in table 3 indicate a moderately strong positive correlation (r= 0.39, p<0.01) between behavioral beliefs and behavioral attitudes. Namely, the stronger the respondents' behavioral beliefs, the stronger their behavioral attitudes.

A moderate positive correlation (r=0.32, p<0.01) was found between behavioral attitudes and behavioral intentions. Namely, the stronger respondents' behavioral attitudes towards the importance of adhering to medication, the greater their behavioral intentions to adhere to prescribed medications.

A strong positive correlation (r=0.66, p<0.01) was found between normative beliefs and subjective norms. Namely, the stronger respondents' normative beliefs, the more their perceived significance of the views of people important to them (subjective norms).

A strong positive correlation was found between subjective norms and behavioral intentions (r=0.54, p<0.05). The greater respondents' subjective norms the greater their behavioral intentions to adhere to prescribed medication.

A moderate positive correlation (r=0.23, p<0.001) was found between behavioral intentions and actual behavior. Namely, the stronger one's behavioral intentions, the greater the actual performance of the behavior.

In addition, a moderate negative correlation (r=-0.25, p<0.01) was found between the number of medications prescribed by doctors and actual behavior, namely the higher the number of prescribed medications the lower the actual adherence to prescribed medication.

A moderate negative correlation (r=-0.290, p<0.01) was found between level of functioning and actual behavior. Namely, the lower respondents' level of functioning the higher their actual adherence to prescribed medication.

The one-way ANOVA found a significant difference (f [3,203] = 3.2, P < 0.05) between those elderly Arabs who had daily assistance in their care and those who didn't. The level of adherence was higher among elderly Arabs who had daily assistance (family involvement) (M=2.7, SD=0.3) compared to elderly Arabs who didn't have daily assistance (family involvement) (M=0.8, SD=1.4)

All variables found to be significant in the univariate analysis were subsequently included in a linear regression model in order to examine the relative impact of the variables in explaining older persons' adherence to medication. Behavioral beliefs and attitudes, as well as normative beliefs and subjective norms, were found to predict the behavior of self-administering medication. Based on the linear regression, these constructs predicted 59% of self-reported adherence to the administration of prescription drugs among older persons.

Discussion

Research findings show a correlation between behavioral attitudes and beliefs of older persons regarding adherence to administration of medications and behavioral intentions to adhere to prescribed medication. Namely, the more respondents believe that medications are important and should be administered; this will be manifested in their behavior in a higher rate of adherence to medications. Such beliefs are acquired based on one's life experience and knowledge of a certain topic, leading to the formation of opinions and impacting one's reasoning about a specific behavior (Ajzen & Fishbein, 1980). Patient beliefs on administering medications are a valued tool for predicting adherence to prescribed medications (Burns, 2009). The perception of medications as beneficial, the perception that medications are essential for your health, and lack of concerns about medications, are all related to high adherence to medication. For example: Older persons who felt that taking Coumadin does not constitute a burden and who believed that it is beneficial tended to adhere to their prescribed medication (Chia *et al.*, 2006).

In addition, normative beliefs and subjective norms were found to affect intention to adhere to medications, namely respondents who attributed more significance to the views of significant others (the treating physician) embraced these views. The meaning attributed by individuals to the administration of medication varies by their relationship with their environment, i.e. people treat medications differently according to the dominant culture (Hanson-Scherman & Lowhagen, 2004). Arab society is a paternalistic hierarchical society in which the physician occupies a high rank and is also usually male, leading to high compliance with medication instructions (Rasuli, 2008). Both the Arab culture and the Muslim religion encourage health-related behaviors that protect people from disease. Arab families, and older persons in particular, do not hesitate to ask for medical help. They prefer to leave the doctor's office with a prescription and are inclined to heed the doctor's instructions (Youssef & Moubarak, 2002).

The current study showed that the involvement of caregivers in the administration of medication was significantly associated with better self-reported drug adherence by older persons. These results are consistent with other studies that showed that the help of caregivers facilitated drug adherence and stability and that the support of a family caregiver was strongly correlated with patients' level of drug adherence (Chisholm *et al.*, 2007, Gatti *et al.*, 2009).

The literature shows that social support has great significance for patients' adherence to medications. For example: a study conducted among men aged 50 and older who take prescription drugs for hypertension and are assisted by their families in routine daily activities showed that their adherence to medications was significantly higher than that of men not assisted by their families. Another study conducted among women aged 60 and older with a heart condition and living alone showed that living alone was strongly correlated with lack of adherence to medications (Schlenk *et al.*, 2004).

Research findings show a correlation between the number of medications prescribed for older persons and their adherence to administration, namely the more medications prescribed the lower their adherence to medications. A study conducted among patients with a mean age of 75 found that those prescribed 3 medications or more a day had a significantly lower rate of compliance with this regimen than those prescribed one medication a day (Schlenk *et al.*, 2004). Taking a large number of medications makes administration more complicated, for example by requiring that medications be taken at different times. This is often crucial as certain medications must be taken separately due to the concern of interaction between medications (Hughes, 2004).

Study Limitations

The results of this study must be interpreted cautiously due to some limitations. This study

presents a cross-sectional picture of self-reported medication adherence. Cross-sectional studies suffer from an inability to determine true causal relationships and the stability of these relationships over time. A key limitation of the study is the use of self-report to measure medication adherence. Another limitation is the fact that the TRA gives little attention to the origin of beliefs and how these beliefs can influence other behaviors. The TRA largely depends on rational processes and does not allow explicitly for the impact of emotions or religious beliefs on behavior, which might be relevant for other illnesses.

In addition, regarding population representation – This study did not represent the entire Arab population of Israel, as respondents were from central / northern Israel, and diverse groups within Arab society were not sufficiently represented (Arabs from southern Israel, Christian Arabs, and Druze).

Conclusions

We have established that older people who hold positive beliefs and attitudes towards adhering to medication and enjoy the support of a significant other will demonstrate higher adherence. This study supports the utility of the model for explaining older people's adherence to medication. In addition, older people who require daily assistance and have a primary caregiver who is in charge of their medication will demonstrate higher adherence. Finally, the more medications prescribed to respondents the lower their adherence.

The findings of this study have several implications for public health nursing practice. Public health nurses have an important responsibility for assessing the medication-taking behaviors of older Arabs, particularly independent older Arabs with multiple medications. In Israel, similar to other countries, Public health nurses with specialized training may issue supplementary drug prescriptions. In light of this recent role, it is important that public health nurses know how to assess older persons' difficulty with the administration of medication. In addition, in their role as providers of information, public health nurses should instruct older Arabs and their families regarding the prescribed medication and its efficiency.

Nurses should determine whether older persons have difficulty in administering their medication due to their health condition and should teach them techniques that will make it easier to take it, particularly in the case of older Arabs who have no supporting family member. In addition, it is important to conduct a qualitative study to examine the perceived significance of adherence to medication among independent older Arabs.

References

Ajzen, I., & Fishbein, M. (1980). Understanding Attitudes and Predicting Social Behavior. Prentice Hall, Englewood Cliffs NJ.

Armitage, CJ., & Conner, M. (2001). Efficacy of the Theory of Planned Behavior: A meta – analytic review. British Journal of Social Psycholog,y, 40:471-499.

Bissonnette, JM. (2008). Adherence: A concept analysis. Journal of Advanced Nursing, 63(6): 634-643.

Burns, S. (2009). Application of the theory of planned behavior to oral anticoagulant therapy. Journal of Nursing and Health Sciences, 11: 98-101

Central Bureau of Statistics .(2010). National Health Survey 2009, press release, accessed January 15, 2011, from: http://www.cbs.gov.il/reader/newhodaot/hodaa_template.html?hodaa=201005118. [Hebrew]

Chia, L., Schlenk, EA., & Dunbar-Jacob, J .(2006). Effect of personal and cultural beliefs on medication adherence in the elderly. Drugs Aging, 23(3):191-202.

Chisholm, MA., Williamson, GM., Lance, CE., & Mulloy, LL. (2007). Predicting adherence to immunosuppressant therapy: A prospective analysis of the theory of planned behavior. Nephro Dialysis Transplant, 22: 2239-2348.

DiMatteo, MR., Haskard, KB., & Williams, SL. (2007). Health beliefs, disease severity, and patient adherence. Medical Care, 45: 521-528.

Farmer, A., Kinmonth, AL., & Sutton, S. (2005). Measuring beliefs about taking hypoglycemic medication among people with type 2 diabetes. Diabetic Medicine, 23: 265-270.

Gatti, ME., Jacobson, KL., Gazmararian, JA., Schmotzer, B., & Kripalani, S. (2009). Relationships between beliefs about medications and adherence. American Journal of Health-System Pharmacy, 66(7): 657-664.

Hansson-Scherman, M., & Lowhagen, O. (2004). Drug compliance and identity: reasons for non compliance. Experiences of medication from persons with asthma/ allergy. Patient Education and Counseling, 54(1): 3-9.

Hassan, NB., Hassanah, CH., Foong, K., Naing, L., Awang, R., Ismail, SB., Ishak, A., Yaacob, LH.,

Harmy, MY., Daud, AH., Shaharom, MH., Conroy, R., & Rahman, ARA. (2006). Identification of psychosocial factors of noncompliance in hypertensive patients. Journal of Human Hypertension, 20:23-29.

Hughes, CM. (2004). Medication non-adherence in the elderly, how big is the problem? Drug Aging, 21(12): 793-811.

June, D. (2008). Medication compliance in the elderly. JCN Online 19, 9 retrieved February 16, from: www.jcn.co.uk/journal.asp?MonthNum=08&YearNum=2005&Type=search&Art icleID=830.

Mackey ER, La Greca, AM. (2008). Does this make me look fat? Peer crowd and peer contributions to adolescent girls' weight control behaviors. Journal of Youth Adolescence, 37: 1097–1110

Osterberg, L., & Blaschke, T .(2005). Drug therapy: Adherence to medication. The New England Journal of Medicine, 353: 487-497.

Rasuli, A. (2008). Multiple medication of elders and chronic patients in the community: Characterization of problems and interventions in this field. Gerontologya, 3: 49-60. [Hebrew]

Schlenk, EA., Engbrg, S., & Dunbar-Jacob, J. (2004). Medication non-adherence among older adults. Journal of Gerontologic Nursing, 30(7): 33-43.

Stevens JP (2002) Applied Multivariate Statistics for the Social Sciences. Lawrence Erlbaum Associates, Mahwah NJ.

Sweileh, W., Aker, O., & Hamooz, S. (2009). Effect of polypharmacy and frequency of drug dosing on rate of compliance among diabetic and hypertensive patients: A survey study in Palestine. An-Najah University Journal, 17: 155–165.

Ross, S., Walker, A., Macleod, MJ. (2004). Patient compliance in hypertension: The role of illness perceptions and treatment beliefs. Journal of Human Hypertension 18: 607-13.

Rubin, R. (2005). Adherence to pharmacological therapy in patients with type 2 diabetes mellitus. The American Journal of Medicine, 118(5A):27-34.

Youssef, RM., Moubarak, LL .(2002). Patterns and determinants of treatment compliance among hypertensive patients. Eastern Mediterranean Health Journal, 8(4/5): 579-592.