An evaluation of foot care behaviours in individuals with type 2 diabetes living in Malta

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Citation: Bartolo P, Mizzi S, Formosa C (2013) An evaluation of foot care behaviour in individuals with type 2 diabetes living in Malta. *Journal of Diabetes Nursing* **17**: 72–77

Article points

1. Individuals with diabetes should maintain adequate foot care, as foot complications can quickly develop in the absence of good glycaemic control, which increases the risk of ulcerations, amputations and mortality.
2. Foot care behaviour was assessed in individuals with type 2 diabetes aged 45–64 years (*n*=30) and ≥65 years (*n*=30); both groups showed suboptimal foot care behaviour, which was not related to age or cognitive differences.
3. Healthcare professionals must help individuals with diabetes improve their foot care behaviour to minimise diabetic foot complications.

Key words

- Assessment
- Education
- Foot care behaviour
- Type 2 diabetes

Authors

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Improving how individuals with type 2 diabetes look after their feet is reported to be one of the most effective strategies in minimising diabetic foot complications. This study evaluated foot care behaviour in people with type 2 diabetes living in Malta. Participants were grouped according to age (45–64 years [*n*=30] and ≥65 years [*n*=30]); the Nottingham Assessment of Functional Footcare (NAFF; Lincoln et al, 2007) was used to determine foot care behaviours in both groups. There was no significant difference in NAFF scores between the two groups (*P*=0.635); the mean NAFF score for the group aged 45–64 years was 55.43 and for the group aged ≥65 years was 54.73. Since the possible maximum NAFF score is 87, both groups showed suboptimal foot care behaviour in terms of footwear, hosiery and wound management. Healthcare professionals play an important part in helping individuals with diabetes improve their foot care behaviour and lifestyle to minimise foot complications.

The incidence of diabetes is increasing; according to epidemiological studies conducted during the past decade, the total number of people with diabetes is predicted to rise from 171 million in 2000 to 366 million in 2030 (Wild et al, 2004). Malta is no exception to this rise in incidence; in fact, 10% of the Maltese population has diabetes, compared with 2–5% of its European neighbouring countries (Rocchiccioli et al, 2005).

One of the serious complications of diabetes is diabetic foot ulceration, which causes a high morbidity and mortality and poses a huge burden on the individual and society (Boulton et al, 2005). Furthermore, poor foot care behaviour is known to increase the risk of ulcerations, amputations and mortality (Rathur and Boulton, 2007). Adequate foot care behaviour is important, as foot complications can develop relatively quickly in the absence of good glycaemic control, even in individuals at low risk (Calle-Pascual et al, 2002). Additionally, individuals at low risk have been found to have difficulty in understanding the risks related to foot complications, impaired wound healing and the need for daily basic foot care, compared with high-risk individuals (Pollock et al, 2004).

Although there have been major advances in the treatment of diabetes, their successful implementation requires behavioural and psychological demands on individuals with this condition (Strine et al, 2005), which can only be achieved by appropriate educational methods (Formosa et al, 2012). The main aim of diabetes education is to change individuals' behaviour and to promote self-management of the condition (Knight et al, 2005; Sigurdardottir et al, 2007). Understanding all factors that can contribute to suboptimal behavioural outcomes in foot care is important if ulceration and amputation rates are to be significantly decreased (Perrin et al, 2009).

Improving foot care behaviour in individuals with type 2 diabetes is reported to be one of the most effective strategies in minimising diabetic

foot complications (Kurniawan and Petpichetchian, 2011). This requires a shift from the traditional biomedical model of care into a biopsychosocial model of care, which would promote positive change (Formosa et al, 2012).

Culture is one factor that is known to strongly influence behaviour (Lifshitz, 2006), and cultural beliefs may contribute to health risks. The Maltese culture is broadly Mediterranean, but it is at the same time distinctive; it has its own unique blend of historical and economic traditions. Although most Maltese argue that their country sits within a wider European culture, certain factors remain exclusive to this country. In particular, the Maltese are, generally speaking, reluctant to relinquish certain traditions, such as religion, social life and "festas" (Mitchell, 2002). The literature suggests that many complications of diabetes, including ulceration, could be ameliorated or prevented if the condition is correctly managed (UK Prospective Diabetes Study Group, 1998; Jabbar et al, 2001). However, people with metabolic conditions such as diabetes in Malta might feel compelled to join in these traditions rather than maintain their strict dietary control; this can lead to poor glycaemic control, and suboptimal behaviour and lifestyle adaptations (Formosa et al, 2011).

This article assesses and compares foot care behaviours in individuals with type 2 diabetes in Malta according to age, as it is acknowledged in the literature that age can affect cognitive function. A study conducted by Ryan and Geckle (2000a) showed that some psychomotor slowing was present but that learning, memory and problem-solving were unaffected in a group of adults with diabetes with a mean age of 51 years; furthermore, Cosway et al (2001) found no evidence of cognitive impairment in a group of adults with diabetes with a mean age of 57 years. However, people aged ≥65 years with diabetes are generally found to have impaired learning, verbal memory and psychomotor functioning. Ryan and Geckle (2000b) proposed that learning and memory impairments in older adults with type 2 diabetes may be the result of:

> *"[...] a synergistic interaction between diabetes-related metabolic derangements and the structural and functional changes occurring in the central nervous system that are part of the normal aging process." (page 308)*

Therefore, it can be concluded that with increasing age, people with diabetes are more likely to be prone to diabetes-associated memory and learning difficulties. However, there is a dearth of Maltese studies exploring such behavioural differences in this specific population, which prompted the need for this study to be conducted in such a diverse population with a unique culture. Individuals with a low risk of developing foot complications were selected for study as these are potentially vulnerable, which highlights the need for an adequate daily foot care regimen combined with good glycaemic control (McInnes et al, 2011).

Study method

This study was approved by the University of Malta's ethics board, and individuals were recruited from the Diabetes and Endocrine Centre, Mater Dei Hospital, Malta, which is the only public hospital on the island. It is estimated that an average of 5000 individuals attend the diabetes podiatry clinic each year, and approximately 500 are known to be suffering from a foot ulceration (Annual Report Diabetes Clinic, 2007). This non-experimental comparative study was carried out in accordance with the principles of the Declaration of Helsinki as revised in 2008 (World Medical Association, 2008).

Consenting adults aged ≥45 years presenting at the Diabetes Podiatry Clinic with the diagnosis of type 2 diabetes who were at low risk of developing foot complications were included. The researcher excluded patients <45 years, those classified with a moderate or high risk of foot complications, those who did not give informed consent and those who could not communicate. Sixty participants were randomly selected on a "first through the door" basis: 30 were aged 45–64 years; and 30 were aged ≥65 years. All those meeting the inclusion criteria (n=60) were invited verbally and in writing to participate in the study.

Outcome measure

The outcome variable measured for both groups was foot care behaviour. Foot care behaviour was assessed by means of the Nottingham Assessment of Functional Footcare (NAFF; Lincoln et al, 2007), which was developed to assess the foot care behaviour of people with diabetes, and is a reliable and valid measure that is easy to administer

Page points

1. The literature suggests that many complications of diabetes, including ulceration, could be ameliorated or prevented if the condition is correctly managed.
2. This article assesses and compares foot care behaviour in individuals with type 2 diabetes in Malta according to age, as it is acknowledged in the literature that age can affect cognitive function.
3. Individuals with a low risk of developing foot complications were selected for study as these are potentially vulnerable, which highlights the need for an adequate daily foot care regimen combined with good glycaemic control.

(Lincoln et al, 2007; Senussi et al, 2011). The NAFF is a quantitative, 29-item self-report measure of the extent to which people comply with foot care behaviour recommended by healthcare professionals; this questionnaire has an internal consistency of 0.53 and the test–retest reliability is reported to be good (Lincoln et al, 2007).

Participants' interviews were conducted by the researcher at the Diabetes and Endocrine Centre, Mater Dei Hospital, Malta. The content of this questionnaire was read to the participants in one-to-one interviews in the Maltese language, and participants were provided with assistance to answer the questions if they required it. Participants were asked to rate responses on a Likert scale (Lincoln et al, 2007), ranging from 0 to 3, to indicate the frequency of occurrence of the behaviour. A higher total score indicates better foot care behaviour; a score of ≤50 suggests that further evaluation of foot care is needed (Senussi et al, 2011). The NAFF was translated into the Maltese language via the back translation method (Nusbaum et al, 2001).

Statistical analysis

Data were analysed using PASW Statistics Version 18 (SPSS Inc, 2009), normality of distribution was established using a Kolmogorov–Smirnov test (Hicks, 2009), and one-way analysis of variance (ANOVA) was used to determine differences in the mean.

Results

All individuals who met the inclusion criteria were invited verbally and in writing, and all agreed to participate (n=60); the demographics of the participants are outlined in *Table 1*. *Table 2* shows the NAFF scores for each study group. When comparing scores between the two groups, no significant difference was found (P=0.635). However, the mean NAFF score for those aged 45–64 years was 55.43 and for those aged ≥65 years was 54.73; as the score is out of a possible total of 87, results imply suboptimal foot care among both study

Table 1. Demographic data of individuals with type 2 diabetes selected for evaluation of their foot care behaviour, grouped according to age.

Variables	Participants aged 45–64 years (n=30)	Participants aged ≥65 years (n=30)
Gender:		
• Male	14 (46.7%)	18 (60%)
• Female	16 (53.3%)	12 (40%)
Age (years)	58.6 (±4.29)	72.76 (±5.64)
Weight (kg)	80.99 (±14.21)	72.62 (±12.58)
Diabetes duration (years)	12.18 (±10.34)	15.54 (±11.02)

Table 2. NAFF scores of study participants.

Participant identifier within each group (total n=60)	Total NAFF score for those aged 45–64 years	Total NAFF score for those aged ≥65 years
• 1	44	68
• 2	54	56
• 3	55	54
• 4	49	58
• 5	51	52
• 6	54	46
• 7	66	55
• 8	54	56
• 9	56	56
• 10	63	59
• 11	68	50
• 12	58	65
• 13	51	58
• 14	57	53
• 15	56	49
• 16	60	50
• 17	56	52
• 18	61	49
• 19	61	61
• 20	60	50
• 21	42	51
• 22	54	56
• 23	58	52
• 24	53	58
• 25	53	55
• 26	48	56
• 27	52	55
• 28	51	61
• 29	50	55
• 30	68	46
Mean score	**55.43**	**54.73**

NAFF=Nottingham Assessment of Functional Footcare (Lincoln et al, 2007).

groups. *Table 3* shows the standard deviation, 95% confidence intervals and minimum and maximum values of the mean NAFF scores for each age group. Regarding the responses to the questionnaire:

- Forty-nine per cent of participants reported that they never inspected their shoes before putting them on, while 80% reported that they never inspected their shoes when taking them off, for foreign bodies and uneven wear.
- Many individuals presented with non-protective shoes, such as sandals (39%), and many reported that they never wore trainers (49%) or lace-up shoes (42%).
- Eighty per cent of participants reported that they never wore seamless socks, stockings or tights.
- Ninety-seven per cent of the participants reported never using a bath thermometer before bathing.
- With regards to wound management, 38% of participants reported that they never applied a dry dressing on blisters, and 42% of the sample reported that they never applied a dry dressing on grazes, cuts or burns.

Table 3. Mean NAFF score analysis for participants grouped by age.

Group	*n*	Mean	Standard deviation	95% confidence interval	Minimum	Maximum
Participants aged 45–64 years	30	55.43	6.25	53.10–57.77	42	68
Participants aged ≥65 years	30	54.73	5.06	52.84–56.62	46	68

NAFF=Nottingham Assessment of Functional Footcare (Lincoln et al, 2007).
P=0.635 for between-group comparison of mean NAFF score.

Discussion

Improving foot care behaviour of individuals with type 2 diabetes is reported to be one of the most effective strategies in minimising diabetic foot complications (Kurniawan and Petpichetchian, 2011). This is the first study to assess foot care behaviour in a Maltese cohort of individuals with type 2 diabetes. The evidence suggests that there is no significant difference in the total NAFF scores between people aged 45–64 years and those aged ≥65 years with type 2 diabetes in this study. However, mean results demonstrated suboptimal foot care behaviour among both groups, despite individuals with diabetes in Malta being offered one-to-one education during consultation visits as well as didactic group education during their course of disease. Suboptimal foot care behaviour is not unique to this study; research suggests that suboptimal behaviour is common among people with type 2 diabetes (Hasnain and Sheikh, 2009; Ikpeme et al, 2010; Senussi et al, 2011).

It has been reported in the literature that organisations recommend self-care of the foot as a means of early detection of foot complications (Perrin et al, 2009); however, the distribution of responses to particular items of the NAFF in this study indicates that certain foot care behaviour is not consistent with what is being recommended by healthcare professionals during clinical consultations (Senussi et al, 2011). Although the importance of footwear has been previously recommended as an essential factor in preventing injury and tissue breakdown (Chantelau and Haage, 1994; White, 1994), some of the inadequacies of foot care practice in this study included inappropriate choice of footwear and hosiery. These practices, together with poor knowledge regarding wound management, could increase morbidity associated with diabetic foot disease.

Intensive effort in health education is required to reinforce self-care behaviour among people with diabetes; a lack of education on foot care has been previously associated with a 3.2 increased risk of amputation (Reiber et al, 1992). In this study, monthly nail trimming was practiced by 56% of those aged 45–64 years and 23% of those aged ≥65 years; this factor could be explained by the fact that most people in the community cut their nails regularly as a habit, rather than as the result of the recommendation of healthcare professionals. Knowledge of appropriate footwear and hosiery was also suboptimal among both groups in this study, and behaviour pertaining to wound management was reported as inadequate, placing individuals at higher risk of diabetic foot complications (Boulton et al, 2005).

It is disappointing that individuals with diabetes sometimes ignore preventive advice given to them by healthcare professionals during consultation visits until they actually acquire a complication (Thomas, 2011). The suboptimal level of foot care practice

Page points

1. In order to improve foot care behaviour among people with type 2 diabetes, the authors suggest that healthcare professionals must identify innovative ways that could help individuals with diabetes maintain necessary changes in their behaviour and lifestyle.
2. As healthcare providers, we need to motivate our patients and improve their concordance by trying to understand and adopt their preferred learning styles.
3. Application of self-efficacy and health behaviour theories in the diabetes healthcare setting as well as diabetes foot educational programmes should bring about better concordance than a didactic approach to education, which is currently offered in Malta.

reported in this study may result from a variety of factors. However, it was not a result of the age difference or cognitive difference between the two age groups, as no significant difference in foot care behaviour was found between them.

In order to improve foot care behaviour among people with type 2 diabetes, the authors suggest that healthcare professionals must identify innovative ways that could help individuals with diabetes maintain necessary changes in their behaviour and lifestyle (Formosa et al, 2012). As healthcare providers, we need to motivate our patients and improve their concordance by trying to understand and adopt their preferred learning styles. While there is no single best way to achieve successful behavioural change, making an effort to understand the wide variety of change situations that encompass the application of self-efficacy and health behaviour theories, and to be familiar with the different characteristics of change itself, will help healthcare professionals negotiate appropriate paths to change (Senior and Fleming, 2006).

There are some widely recognised change theories and models in the literature that pertain to bring about behavioural change, including: Lewin's three-step change theory; Lippitt's phases of change theory; Prochaska and DiClemente's change theory; social cognitive theory; theory of reasoned action and planned behaviour; and the communication–behaviour change model (Browning and Thomas, 2005; Kritsonis, 2005; Nutbeam and Harris, 2005). The relative consistency of theories and models serves as a testimony to the fact that change is a phenomenon that can be observed and analysed through various steps or phases. All these above-mentioned theories have different methods and assumptions that make each theory unique, although some do share certain commonalities.

The social cognitive theory (Babdura, 1986) takes into account both the external and internal environment conditions and suggests that behavioural change is affected by environmental influences, personal factors and attributes of behaviour itself. Prochaska and DiClemente's change theory (Prochaska and DiClemente, 1986) is different from the other theories. This model has two basic dimensions that describe both the different stages of change and the processes of change relevant to the different stages. The model is based on the premise that behaviour change is a process, not an event, and that individuals have varying levels of motivation or readiness to change (Nutbeam and Harris, 2005). The theory of reasoned action (Ajzen and Fishbein, 1980) explains human behaviour that is under "voluntary" control. A major assumption underlying this theory is that people are usually rational and will make predictable decisions in well-defined circumstances. The communication–behaviour change model developed by (McGuire, 1989) helps design and guide public education campaigns; it provides an insight and guidance on the strengths and weaknesses of mass communication, especially in health promotion.

Changing behaviour means inhibiting habitual responses and producing new responses that might feel awkward and unfamiliar to those involved (McGuire, 1989). Unless behavioural theories are put into the broader context in which the individual is living, many factors that influence health will remain unexplained. Understanding how to do this effectively can bring about profound impacts on health (Whitehead, 2004). Improvements in diabetes education with attention given to the application of health psychology, health behaviour theories, communication theories, patient empowerment and cultural beliefs may improve knowledge and translate into improved behaviour and quality of life (Formosa et al, 2012). The true success of care will only be measured in better behavioural and health outcomes. More research is warranted to explore further psychosocial interventions in diabetes care.

Conclusion

Findings of this study are congruent with other previous studies demonstrating suboptimal foot care behaviour among people with type 2 diabetes. Application of self-efficacy and health behaviour theories in the diabetes healthcare setting as well as diabetes foot educational programmes should bring about better concordance than a didactic approach to education, which is currently offered in Malta. Improved behaviour could result in better quality of life, improved health outcomes, fewer health-related complications and less expenditure from healthcare budgets. It would be unrealistic to

expect behavioural change strategies to be effective in a short period of time; successful strategies require realistic time frames to implement the complex and multi-level changes required inside any healthcare system. Further research is warranted to measure the effectiveness of any changes to the current structured and didactic diabetes education programme that embraces all of the factors in a valid behaviour-change education programme. This could be further evaluated to determine whether such change in educational strategies could result in better behavioural outcomes, and thus fewer diabetes foot-related complications. ■

Acknowledgments

The authors would like to thank all participants who agreed to take part in this study. The authors are grateful to Professor Nadine Lincoln, who gave permission to use the NAFF questionnaire, and would also like to thank the podiatrists and nurses working at Mater Dei Hospital, Malta, for their help and support during data collection.

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