Factors Related to Compliance Among Adolescents with Diabetes Mellitus Type 1: A Non-Randomised Controlled Study of a Group Information and Peer-Discussion Programme

Mary Ngandu, Anitha Menon

Department of Psychology, University of Zambia

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ABSTRACT

Objectives: This study explored factors related to treatment compliance among adolescents with type 1 diabetes mellitus (DMT1) in Lusaka, Zambia, and examined whether compliance was related to quality of life. The factors examined were the time at which insulin is taken, changes in insulin dosage, delays in meal timing, lapses in diet, physical exercise and hypoglycaemic episodes. The study also compared these factors between adolescents who received a group information and peer-discussion programme and a wait-list control group.

Methodology: This was a non-randomised controlled study with a wait-list control group. Forty adolescents aged 16 to 19 years who had been diagnosed with DMT1 within the previous six months were recruited at the Diabetes Association of Zambia (DAZ) Centre, University Teaching Hospital (UTH). They were allocated within strata of gender and age band by alternation (even or odd position on an alphabetical list) to either an intervention group (n = 20) or a control group (n = 20). The intervention comprised eight weekly one-hour sessions that combined diabetes information, access to clinic staff and participant-led group discussion.

Measures: A social demographic questionnaire, the Rating Scale for Compliance (RSC) and the Diabetes Quality of Life Scale modified for youths (DQOL) were administered at baseline (week 1) and follow-up (week 10).

Results: At baseline, the intervention group was less compliant than the control group ($p = .001$). At follow-up, the pattern reversed: all 20 adolescents in the intervention group reported taking insulin on time, making no unprescribed dose changes, keeping meals on time, having no diet lapses, exercising at least five times a week and having no hypoglycaemic episodes, compared with 45% to 75% of the control group on the insulin, meal, diet and hypoglycaemia items and 15% on exercise. The difference in total compliance at follow-up was large ($p < .001$; rank-biserial correlation 0.95, approximate 95% CI 0.85 to 1.00), and all 20 intervention participants improved from baseline (exact sign test, $p < .001$); a summary-level sensitivity analysis indicated that adjusting for baseline would increase, not reduce, the estimated advantage. At follow-up the intervention group also reported less impact of diabetes and fewer worries but lower satisfaction with life. Across both groups, better compliance was associated with better quality of life ($r = 0.468$, 95% CI 0.18 to 0.68, $p = .002$; lower scores are more favourable on both scales).

Conclusion: Adolescents who took part in the programme reported better compliance than the wait-list control group at follow-up, and better compliance was associated with better quality of life. Because allocation was not random, the groups differed at baseline, the programme had several components and all outcomes were self-reported, these findings are preliminary. They need confirmation in larger randomised multi-site trials that separate information from peer support and include objective measures such as HbA1c.

Keywords: Adolescents, diabetes, compliance, factors, quality of life

INTRODUCTION

Diabetes mellitus is a chronic condition that now affects nearly one in nine adults worldwide, and about 1.8 million children and young adults under 20 years of age are living with type 1 diabetes (IDF, 2025). It is one of the most common non-communicable diseases globally, and complications such as coronary artery and peripheral vascular disease, stroke, neuropathy, amputation, renal failure and blindness are causing increasing disability, reduced life expectancy and enormous health costs (IDF, 2009). Type 1 diabetes accounts for roughly 5 to 10% of all cases of diabetes but for nearly all diabetes in children in populations of European origin, and its incidence continues to rise worldwide (IDF, 2025; Novato et al., 2008; Novato and Grossi, 2011).

Diabetes in Zambia

There are few detailed studies of diabetes in Zambia (Baren et al., 2005). The higher priority given to diabetes care in national health planning has been attributed in part to the advocacy and educational work of the Diabetes Association of Zambia (Baren et al., 2005). Much of the available data on type 1 diabetes in sub-Saharan Africa is limited, and children with the condition often go undiagnosed or lack access to insulin, syringes and monitoring equipment (Majaliwa et al., 2008; IDF, 2011). Information obtained from the DAZ coordinator in 2012 indicated that the Association's UTH centre is the main screening point for urban Lusaka, that many adolescents are given autonomy over their own care with limited caregiver support, and that adolescents who do not enrol at the centre have little access to health education (R. Ng'onga, personal communication, 13 March 2012).

Pathogenesis of type 1 diabetes

Type 1 diabetes results from autoimmune destruction of pancreatic beta cells in a genetically susceptible individual, usually leading to absolute insulin deficiency (Daneman, 2006). Without insulin, glucose accumulates in the blood (hyperglycaemia) while the cells are starved of energy, so that fat and protein are broken down, and tissue wasting follows (Obasi, 2006; Court et al., 2009). Lifelong insulin treatment, dietary control and regular exercise are therefore required, and failure to follow them can result in ketoacidosis or hypoglycaemia (Obasi, 2006).

Diabetes and adolescence

Adolescence is a period of growing independence from parents. Adolescents want to make their own choices, and having a disease can make them feel powerless; some try to regain control by skipping medication, missing appointments or ignoring dietary restrictions (Taddeo et al., 2008). Over-protective parenting can delay the development of responsibility for treatment, while handing over responsibility too early increases the risk of poor adherence, poor metabolic control and repeated hospital admissions (Frank, 2005; Taddeo et al., 2008). Adolescents may also hide their diabetes from peers in order to fit in, may focus on the present rather than on long-term consequences, and may experiment with alcohol or drugs (Guthrie et al., 2003). Adolescents with diabetes are at increased risk of depression and anxiety, and routine psychological screening and support are recommended for young people with the condition (Cameron et al., 2007; de Wit et al., 2022).

Compliance and its correlates

Compliance with diet, exercise and medication is a major determinant of outcome in diabetes (Delamater, 2006), and non-compliance can lead to life-threatening complications (Novato and Grossi, 2011). Compliance is, however, low in about half of adolescents with type 1 diabetes (Frank, 2005). In a national sample of 300 Finnish adolescents with diabetes, good adherence was predicted by motivation, energy and willpower and by support from nurses (Kyngäs, 2007). Among 74 children aged 11 to 16, 49% did not follow insulin and diet recommendations, 75% did not complete prescribed glucose tests and 64% did not follow exercise recommendations (Patton, 2006). Reported barriers include behavioural factors (poor planning, lack of supplies), cognitive factors (embarrassment, limited knowledge, fear) and environmental factors (limited time, lack of supervision) (Patton, 2006). Family social support, duration of diabetes and social class have been shown to predict compliance (Pereira et al., 2008). Poor coping and psychological distress are further correlates (Graue et al., 2004).

Very little is known about these factors among Zambian adolescents. This study therefore aimed to describe six components of compliance among adolescents with DMT1, to compare them and quality of life between adolescents who received an eight-week group information and peer-discussion programme and a wait-list control group, and to establish how compliance relates to quality of life.

METHODS

Study design

This was a non-randomised controlled study with a wait-list control group, with outcomes measured at baseline (week 1) and follow-up (week 10). Allocation was by alternation on an alphabetical list, which is a predictable, systematic procedure and not random allocation (see Participants and allocation). Data were collected from participants aged 16 to 19 years. The report was prepared with reference to the TREND statement for non-randomised evaluations of behavioural interventions (Des Jarlais et al., 2004).

Measures

Compliance was measured with the Rating Scale for Compliance (RSC; Clarke and Goosen, 2005), which covers insulin, diet, exercise and hypoglycaemic episodes through six items: time at which insulin is taken, units of insulin, delay in meal timing, lapse in diet, physical exercise and hypoglycaemic episodes. Items refer to the preceding seven days. Quality of life was measured with a modified Diabetes Quality of Life Scale for youths (Ingersoll and Marrero, 1991; DCCT Research Group, 1988), a 39-item measure with subscales for impact of diabetes, worries about diabetes and satisfaction with life.

Scoring direction. Both instruments are scored so that a lower score is more favourable. On the RSC a lower total score indicates higher compliance. On the quality-of-life scale a lower score indicates less impact of diabetes, fewer worries and greater satisfaction with life. A positive correlation between the two totals therefore means that better compliance goes with better quality of life. Throughout this report “better” compliance means a lower RSC score.

Reliability and validity. The RSC has been used in a New Zealand diabetes sample (Clarke and Goosen, 2005), and the youth quality-of-life measure was reported to have satisfactory reliability when it was developed (Ingersoll and Marrero, 1991). Neither instrument has been validated in Zambian adolescents, and both were self-completed in English by literate participants, so the scores rely on self-report and on the participants’ reading ability. Internal consistency (Cronbach’s alpha) was not calculated for the present sample, so the reliability of the scores here is unknown.

Study setting

The study was conducted at the Diabetes Association of Zambia Centre at the University Teaching Hospital, Lusaka. The Centre provides counselling, blood sugar testing, treatment and support to people with diabetes and had 250 adolescent members in March 2012.

Participants and allocation

Forty adolescents with DMT1, aged 16 to 19 years, literate in English, members of DAZ and diagnosed within the previous six months (so that they were still adjusting to the illness) were recruited from DAZ records. Adolescents who were ill at the time of the study or who did not consent were excluded. Eligible adolescents were listed alphabetically, grouped by gender and then by age band (16-17 and 18-19 years), and allocated within each band to the intervention or control group by even or odd position on the list, giving two equal groups of 20. The sample size was set by the number of adolescents who enrolled at DAZ (a minimum of three a week, about 72 in six months, according to DAZ records dated 13 March 2012), not by a power calculation.

This is systematic alternation, not random allocation. The sequence was predictable to the researcher who listed, enrolled and assessed the participants, so allocation was not concealed, and no random number sequence was

used. Participants could not be blinded to their group. Alternation produced groups with identical gender and age distributions but did not prevent a clear difference in baseline compliance (see Results), which may reflect chance or some feature of the alphabetical ordering, such as siblings or relatives sharing a surname. The study is therefore treated as a non-randomised comparison in which differences between groups at follow-up cannot be attributed to the programme without allowing for baseline differences.

Procedure

Baseline measures were taken in week 1 (time 1). The intervention group then met the researcher for one hour each week in weeks 2 to 9. Follow-up measures were taken in week 10 (time 2) for both groups. In this report follow-up means the first assessment after the programme: week 10 was one week after the last session (week 9), so it shows short-term outcomes and does not show whether the changes were sustained. Questionnaires were completed one after the other in a group setting after the instructions had been read aloud. The researcher met both groups at the DAZ Centre. The same researcher delivered the sessions and administered the questionnaires, so outcome assessment was not blinded.

Intervention

The programme was a package of several components, which are listed so that the contribution of structured information can be distinguished from the others. (1) **Structured information:** each session gave information on diabetes, compliance and quality of life, using the booklet *You, Me and Diabetes* (De Jong and Bennink, 2006), which covers diet, exercise and taking prescribed treatment, and participants received a take-home leaflet on recommended diet. (2) **Access to clinicians:** DAZ staff who are medical practitioners answered questions on diet, exercise and treatment. (3) **Peer discussion:** each session reviewed group rules and included participant-led discussion. (4) **Social contact and incentives:** sessions included non-competitive free interaction time and a snack, and participants received a transport allowance. After follow-up, the control group received the same programme.

The control group had no sessions between baseline and follow-up, so the comparison does not control for the extra contact time, attention, group membership or refreshments that the intervention group received. The design therefore tests the whole package, not information giving alone.

Ethical considerations

Permission was obtained from the study site, and approval was obtained from the Research Ethics Committee, University of Zambia. Participation was voluntary with informed consent, questionnaires were completed anonymously using codes, and participants received a transport allowance and refreshments.

Data analysis

Data were analysed with SPSS version 16.0. Descriptive statistics were used to describe participants and to show the response to each compliance item at each time point. The Mann-Whitney U test was used to compare the control and intervention groups on total compliance and on the quality-of-life subscales at baseline and follow-up. Effect sizes are reported as the rank-biserial correlation ($2\theta - 1$, where θ is the probability that a randomly chosen intervention participant scores lower, that is better, than a randomly chosen control participant; Cliff, 1993), with approximate 95% confidence intervals from the Hanley and McNeil (1982) standard error of θ. These were calculated from the U statistics, ignore tie corrections and are therefore approximate; positive values favour the intervention group.

Because the groups differed in compliance at baseline, baseline adjustment was examined in two ways with the group-level data available for re-analysis. Each RSC item is scored 0 to 3, with 0 the most compliant response, so the total ranges from 0 to 18. First, in the intervention group every participant scored 0 on all six items at follow-up, whereas none scored 0 on the insulin-timing item at baseline, so every participant's total score must have fallen; change in this group was therefore tested with an exact sign test. Second, a summary-level sensitivity analysis used the mean ranks of the baseline and follow-up totals, which are the group means that a rank-based

analysis of covariance uses (Conover and Iman, 1981), to calculate the adjusted group difference as the follow-up difference minus b times the baseline difference, across plausible values of the pooled within-group slope b (Vickers and Altman, 2001). The primary outcome was total compliance at follow-up.

A bivariate Pearson correlation, with a 95% confidence interval from the Fisher z transformation, was used to test the hypothesis that compliance is positively correlated with quality of life, at a significance level of 0.01. No correction was made for multiple comparisons, so all results other than the primary outcome are exploratory.

RESULTS

Characteristics of participants

The two groups were identical in gender and age distribution (Table 1). Most participants were in grade 11 to 12 (60%), and 15 (37.5%) lived with both parents while 10 (25%) lived with neither parent. Thirty participants (75%) reported that diabetes was not common in their families.

Table 1: Characteristics of participants

Characteristic	Control (n = 20)	Intervention (n = 20)	Total (N = 40)
Male	11 (27.5%)	11 (27.5%)	22 (55%)
Female	9 (22.5%)	9 (22.5%)	18 (45%)
Aged 16-17 years	7 (17.5%)	7 (17.5%)	14 (35%)
Aged 18-19 years	13 (32.5%)	13 (32.5%)	26 (65%)
Grade 11-12	12 (30%)	12 (30%)	24 (60%)
Lives with both parents	8 (20%)	7 (17.5%)	15 (37.5%)
Lives with neither parent	5 (12.5%)	5 (12.5%)	10 (25%)

Percentages are of the total sample of 40.

Factors related to compliance: item-level findings

Table 2 shows the proportion of each group in the most compliant response category for each item.

Table 2: Adolescents in the most compliant category on each factor in the previous seven days, n (%)

Factor (most compliant category)	Control, baseline	Control, follow-up	Intervention, baseline	Intervention, follow-up
Insulin taken on time on all days	2 (10%)	15 (75%)	0 (0%)	20 (100%)
No change to insulin dose other than that prescribed	1 (5%)	11 (55%)	0 (0%)	20 (100%)
All meals on time, or no more than three delayed	0 (0%)	9 (45%)	1 (5%)	20 (100%)
No lapse in diet	0 (0%)	11 (55%)	0 (0%)	20 (100%)
Exercise at least five times a week	4 (20%)	3 (15%)	0 (0%)	20 (100%)
No hypoglycaemic episodes	0 (0%)	10 (50%)	2 (10%)	20 (100%)

Timing of insulin. At baseline, 18 intervention participants (90%) and 11 control participants (55%) reported that insulin was not taken on time on more than three occasions. At follow-up all 20 intervention participants took insulin on time on every day, compared with 15 (75%) of the control group.

Insulin dosage. At baseline, 18 intervention participants (90%) and 11 control participants (55%) had changed their prescribed dose more than three times. At follow-up no intervention participant made a change other than that allowed, compared with 11 (55%) of the control group; 9 control participants still altered their dose.

Meal timing. At baseline, 18 intervention participants (90%) and 11 control participants (55%) delayed meals

on more than seven occasions. At follow-up all intervention participants had all meals on time or no more than three delayed, compared with 9 (45%) of the control group.

Lapses in diet. At baseline, 18 intervention participants (90%) and 14 control participants (70%) had lapsed from their diet more than five times. At follow-up, none of the intervention group reported a lapse, compared with 11 (55%) of the control group.

Physical exercise. At baseline, 17 intervention participants (85%) and 7 control participants (35%) had not exercised at all in the previous week. At follow-up all intervention participants exercised at least five times a week, compared with 3 (15%) of the control group, although 12 control participants (60%) exercised at least three times a week.

Hypoglycaemic episodes. At baseline, 16 intervention participants (80%) and 7 control participants (35%) reported more than five episodes. At follow-up the intervention group reported no episodes, compared with 10 (50%) of the control group; 2 control participants (10%) still reported more than five episodes.

All 20 intervention participants were in the most compliant category on every item at follow-up, so there was no variation within that group (a ceiling effect), which limits what the item-level percentages can show.

Total compliance

Table 3 shows the Mann-Whitney U comparison of total compliance scores. A lower score indicates higher compliance. At baseline the intervention group had significantly poorer compliance than the control group (U = 82, p = .001; rank-biserial correlation −0.59, approximate 95% CI −0.87 to −0.31, the negative sign indicating that the intervention group was worse). At follow-up the intervention group had significantly better compliance (mean rank 11.00 versus 30.00; U = 10, p < .001; rank-biserial correlation 0.95, approximate 95% CI 0.85 to 1.00). This corresponds to a probability of 0.975 (approximate 95% CI 0.93 to 1.00) that a randomly chosen intervention participant reported better compliance than a randomly chosen control participant.

Table 3: Total compliance to treatment (Mann-Whitney U test)

Time	Control mean rank	Intervention mean rank	U	Z	P	Rank-biserial r (approx. 95% CI)
Baseline	14.60	26.40	82	−3.416	.001	−0.59 (−0.87 to −0.31)
Follow-up	30.00	11.00	10	−5.570	<.001	0.95 (0.85 to 1.00)

Positive rank-biserial values favour the intervention group; n = 20 per group. Lower scores indicate better compliance. Confidence intervals are approximate (see Data analysis).

Baseline-adjusted analysis. Within the intervention group, all 20 participants had a lower (better) total compliance score at follow-up than at baseline (exact two-sided sign test, $p = 1.9 \times 10^{-6}$). On the rank scale, the intervention minus control difference was −19.0 at follow-up (11.00 minus 30.00) and +11.8 at baseline (26.40 minus 14.60). Adjusting the follow-up difference for baseline gives −19.0 − 11.8b, where b is the pooled within-group slope of follow-up rank on baseline rank. For b = 0 (no adjustment), 0.5 and 1.0 the adjusted difference is −19.0, −24.9 and −30.8 rank units, and it would reach zero only if b were about −1.6, which would mean that adolescents who were less compliant at baseline became much more compliant at follow-up within each group. This is implausible, because regression to the mean implies a slope between 0 and 1. Adjusting for baseline would therefore be expected to strengthen the estimated advantage of the intervention group, not remove it. This is a sensitivity analysis from group-level summaries and gives no confidence interval, and the common-slope assumption of ANCOVA is strained because intervention follow-up scores had no variance.

The intervention group began as the less compliant group and ended as the more compliant group. Regression to the mean would be expected to move extreme baseline scores towards the overall mean, not to reverse the ranking and produce almost complete separation, but it may have contributed to the size of the change and cannot be excluded without the baseline-adjusted result.

Compliance and quality of life

Quality-of-life subscales did not differ between groups at baseline. At follow-up the intervention group reported a lower impact of diabetes (mean rank 16.8 versus 24.2, p = .045; rank-biserial correlation 0.37, approximate 95% CI 0.04 to 0.70) and fewer worries about diabetes (14.32 versus 26.68, p = .001; 0.62, 0.35 to 0.89), but also lower satisfaction with life than the control group (28.50 versus 12.50, p < .001; −0.80, −1.00 to −0.60; lower scores indicate greater satisfaction, so the negative value shows that the intervention group was less satisfied). The impact result is borderline and, with several outcomes tested without correction, these subscale findings should be regarded as exploratory.

At follow-up, total compliance and total quality-of-life scores were positively correlated across the whole sample (Pearson r = 0.468, 95% CI 0.18 to 0.68, p = .002, N = 40). Because a lower score is more favourable on both scales, the positive coefficient means that adolescents with better compliance also reported better quality of life. The coefficient pools both groups, and group membership was related to both variables, so it may partly reflect the intervention rather than an association within groups.

DISCUSSION

This study explored the factors related to compliance among adolescents with DMT1 in Zambia. The main finding is that, after eight weeks of group information and peer discussion, adolescents in the intervention group reported better compliance on every component examined than the control group, moving from poorer compliance than the control group at baseline to the best compliance at follow-up. Compliance was also positively related to quality of life. Because allocation was by alternation, the groups differed at baseline, the programme had several components and all outcomes were self-reported, these results show an association between taking part in the programme and better reported compliance; they do not establish that information giving caused the change. The discussion considers the factors that may explain the findings, drawing on the literature, since the study measured behaviour rather than its psychosocial causes.

Knowledge and information

The intervention gave adolescents information on diet, exercise and taking prescribed treatment, and self-reported compliance with those behaviours was higher at follow-up. This is consistent with the view that education about the illness and its treatment supports adherence (Delamater, 2006). Better understanding may also reduce the anxiety, depression and maladaptive coping that accompany poor diabetes management in adolescents (Delamater, 2006). Insulin timing and dose, which are the most concrete and directly taught behaviours, reached full self-reported compliance in the intervention group, in line with reports that diet and exercise are harder to sustain than insulin treatment (Pereira et al., 2008). However, the booklet and leaflet were delivered together with access to clinicians, peer discussion and regular contact with the researcher, and the control group had no equivalent contact, so the effect of information cannot be separated from the effects of peer support, attention and group membership. Knowledge alone is also not sufficient, because behavioural factors such as family stress, poor social coping and problem solving, and inappropriate levels of responsibility for self-management predict lower compliance even when knowledge is good (Patton, 2006).

Diet and exercise

Diet and exercise are among the most difficult aspects of diabetes management (Pereira et al., 2008). Peer pressure to eat junk food and the growing autonomy of older adolescents have been proposed as reasons for resistance to dietary adjustment (Pereira et al., 2008). In the control group, only 45% kept meals on time and 55% avoided diet lapses at follow-up, and only 15% exercised five times a week, which suggests that these behaviours may be harder to change without support. Regular exercise and consistency of meals and exercise from day to day reduce insulin requirements and help prevent complications (Obasi, 2006). In the intervention group, the take-home diet leaflet, the opportunity to question DAZ medical staff and the shared sessions may all have supported these behaviours, but the design cannot separate their contributions.

Hypoglycaemia

The proportion of intervention participants reporting more than five hypoglycaemic episodes fell from 80% to

none. Hypoglycaemia is the most common acute complication of type 1 diabetes in childhood, and it is associated with fear, anxiety and reduced quality of life (Fidler and Gillard, 2011). Missed insulin doses, delayed meals and unprescribed dose changes are plausible contributors, so improvement in those components would be expected to reduce episodes. However, no episodes at all in 20 of 20 insulin-treated adolescents is unusual and may reflect under-reporting, social desirability or a ceiling effect, particularly as hypoglycaemia was measured by recall and was not checked against meter data or HbA1c. This interpretation should therefore be treated cautiously.

Family, peers and the care environment

Family factors are consistently linked with compliance. Higher family social support predicted higher compliance and quality of life, and family conflict predicted lower quality of life (Pereira et al., 2008; Lewin et al., 2006). Pushing adolescents to full autonomy too early increases the risk of poor control (Frank, 2005). In this sample, only 37.5% lived with both parents and 25% lived with neither, and DAZ reports that many adolescents receive little caregiver support. These factors were balanced across the groups and were not analysed as predictors, so their influence cannot be quantified. The weekly sessions also gave adolescents a chance to share coping experiences and support one another, and peer support has been suggested to reduce isolation and stigma and to promote better self-management (Grayson, 2002).

Psychological factors, coping and worries

Adolescents may struggle to incorporate a chronic illness into their developing identity, which can look like denial and lead to low compliance (Taddeo et al., 2008; Frank, 2005). Emotion-focused coping has been associated with poorer metabolic control and lower diabetes-related quality of life (Graue et al., 2004). The intervention group reported fewer worries about diabetes and a lower impact of diabetes at follow-up, which is consistent with acceptance and improved coping going hand in hand with better compliance. The positive correlation between compliance and quality of life ($r = 0.468$; a lower score is more favourable on both scales) is consistent with this, although a correlation does not show the direction of the relationship and was calculated across both groups.

Satisfaction with life

The intervention group was less satisfied with life than the control group at follow-up despite better compliance. This was not measured directly, but possible explanations include family stress, inappropriate levels of responsibility for management, over-involvement of caregivers, long waits or unfriendly reception at the health facility, and the stigma attached to a regimen that is visible to others, such as injecting insulin and eating at set times (Taddeo et al., 2008). It is also possible that stricter adherence made the daily burden of the regimen more noticeable. Time with family and peers is thought to improve satisfaction with life (Grayson, 2002), and this should be tested in future work. This finding also means that the relationship between compliance and quality of life is not uniform: the intervention group had better compliance, less impact and fewer worries, yet lower satisfaction, so the pooled correlation should not be read as better compliance improving every aspect of quality of life.

Disease duration, age, gender and social class

Longer disease duration and older age have been associated with lower compliance and poorer metabolic control, higher social class with better compliance, and family support with better compliance among girls (Pereira et al., 2008). All participants in this study were within six months of diagnosis, were of similar age and were drawn from one urban centre, so these factors could not be examined.

CONCLUSION

Among Zambian adolescents with DMT1, those who took part in an eight-week programme of information and group discussion reported better compliance with insulin timing, insulin dosage, meal timing, diet, exercise and hypoglycaemia control than a wait-list control group, and better compliance was associated with a better quality of life. Knowledge, family and caregiver support, peer interaction, coping and the quality of the care environment are plausible explanations and should be addressed together. Because the design was non-randomised and small,

the findings support piloting such programmes in adolescent diabetes care, with psychologists and diabetes educators involved, rather than their routine adoption. Future studies should use genuine random allocation with concealment, a sample size calculation, blinded assessment and a design that separates education alone from education plus peer support, and should assess family, caregiver and psychosocial variables and biochemical measures such as glycosylated haemoglobin.

Limitations

Design and allocation. Allocation by alternation on an alphabetical list is predictable and was not concealed, so the study is not a randomised trial and selection bias cannot be excluded. The groups differed significantly in compliance at baseline, with the intervention group less compliant, which may reflect chance or the allocation procedure; part of the improvement may reflect regression toward the mean. The researcher delivered the programme and collected the outcomes, and participants were not blinded.

Intervention. The programme combined information, access to clinicians, peer discussion, social contact and refreshments, and the control group received no equivalent contact, so the contribution of information giving cannot be separated from attention, peer support and group membership.

Measurement. All data were self-reported and may be affected by social desirability; the finding that every intervention participant was in the most compliant category on every item at follow-up may reflect a ceiling effect or over-reporting, and compliance was not verified against clinical measures such as HbA1c. The instruments have not been validated in Zambian adolescents and were completed in English in a group setting.

Sample and analysis. The sample was small, recruited from a single centre in Lusaka, and relatively homogeneous, so the findings cannot be generalised to other adolescents with DMT1 in Zambia and statistical power and precision were limited. Compliance scores are ordinal, many outcomes were tested without correction for multiple comparisons, and the correlation between compliance and quality of life pools both groups and cannot show direction. Baseline adjustment was assessed only through a summary-level sensitivity analysis, because participant-level scores were not available for a full covariance analysis, and internal consistency and within-group correlations were not calculated. Follow-up was limited to ten weeks, so it is not known whether the reported improvement was sustained, and psychosocial factors were inferred from the literature rather than measured. The study also characterised adolescents at higher risk of poor compliance, in whom factors such as parental neglect may interfere with treatment.

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