

A qualitative study of the early effects of fixed orthodontic treatment on dietary intake and behaviour in adolescent patients

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SUMMARY The aim of this research was to assess the effects of fixed orthodontic treatment on dietary intake and behaviour. The study adopted a qualitative approach by conducting semi-structured one-to-one interviews, with 10 adolescent patients (four males; six females) undergoing fixed orthodontic treatment with a mean age of 13.21 (SD 0.71) years. The interviews were transcribed and analysed, by two independent investigators, using framework principles in which emerging themes and ideas were identified. These emerging themes were characterized and compared between patients until no new themes or ideas were identified.

Framework analysis identified the following two main themes arising in adolescent patients undergoing fixed orthodontic treatment: pain experience and dietary change. All patients reported varying degrees of pain during the first few days of treatment, after which it was seen to reduce. All patients reported that their diet had changed in response to pain, inability to bite and chew, and in response to dietary instructions given to them by their orthodontist. Patients felt that their eating habits had become healthier during treatment. The study highlights the need to explore dietary changes in a larger population base.

Introduction

Patient-centered care is a relatively new concept, aimed at understanding patients' treatment needs, experiences, satisfaction, and the perceived overall quality of the healthcare system (McGrath and Bedi, 1999).

Treatment time with fixed appliances is subject to considerable variation and is highly dependent on malocclusion complexity and the treatment approach adopted (Turbill *et al.*, 2001). Among the frequent complaints that patients raise during treatment is the amount of discomfort, including pain from their teeth, oral ulceration, tongue soreness, and functional limitations (Brown and Moerenhout, 1991; Serfl *et al.*, 1998; Bergius *et al.*, 2002; Bartlett *et al.*, 2005; Fleming *et al.*, 2009).

The relationship between oral health status and dietary intake is well documented in the literature. It is acknowledged that both the number and condition of teeth can result in impaired masticatory function, which in turn can lead to changes in food choice and habits (Acs *et al.*, 1992; Sheiham *et al.*, 1999).

In orthodontics, many studies have explored the physical, social, and psychological effects of treatment and how pain and discomfort affect these aspects of life. Most of these investigations have found that oral health status and quality of life are negatively affected (Zhang *et al.*, 2008). However, there is very limited information available on the effects of

appliance treatment on dietary intake (Cheraskin and Ringsdorf, 1969a,b; Riordan, 1997). The main challenge in this field is that nutritional epidemiology is complex and methods of dietary assessment are not without limitations (Bingham, 1991).

In the last two decades, qualitative approaches in research have become popular and accepted methods across different disciplines (Feldmann *et al.*, 2007; Ryan *et al.*, 2009). In contrast to quantitative research, qualitative research is concerned with the quality or nature of human experiences and the meanings of phenomena to individuals. If a study is explanatory in nature or attempting to find a meaning and understand experiences of a given situation to a group of individuals, qualitative methodologies are an appropriate choice (Draper, 2004). As a result, a qualitative approach would appear to be beneficial in exploring patients' dietary behaviour during the course of treatment.

The aims of this study were to elucidate patients' dietary changes during the early stages of fixed appliance treatment and to identify factors that influence this change in behaviour.

Subjects and methods

This research was approved by the East London and The City Ethics Committee (08/H0703/50). Figure 1 illustrates the steps involved in conducting the study.

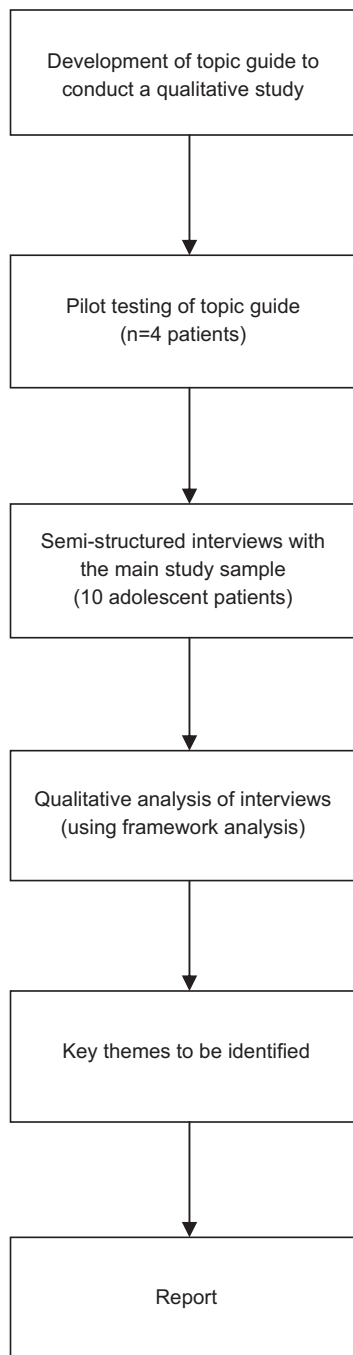


Figure 1 Steps involved in conducting the study.

Participants

Patients who were due to undergo fixed appliance treatment in the Orthodontic Clinic at the Dental Institute, Barts and The London Hospital (BLH) were identified and recruited on the basis of the following selection criteria: aged 11–14 years, requiring upper and lower fixed appliances, and medically fit and well. Patients were excluded from the study if there was a history of chronic disease or medication which might influence nutritional habits, those with syndromic

conditions, undergoing orthognathic surgery or having adjunctive removable appliance therapy, or who were fasting at any point during the study.

The subjects were selected using the principles of purposive sampling in order to provide as wide a range of experiences in terms of dietary intake and behaviour. Thus, the sample included patients of different genders, ages, and ethnicity to reflect the diversity of dietary intake in the population treated. All patients were interviewed at their first review appointment (4–6 weeks), following placement of their fixed appliances.

Ten patients (four males; six females) were recruited to the main study, with a mean age of 13.21 (SD 0.71) years. Four patients were Caucasian, four were Asian, and two were Afro-Caribbean.

Procedure

Semi-structured one-to-one interviews were undertaken, with no time constraints, in a non-clinical setting to ensure privacy. Interviews were based on a topic guide, which was a list of key questions to be asked, with help available to define areas to be explored in relation to the research objectives. This approach is considered appropriate for children and provides them with some guidance on what to talk about (Gill *et al.*, 2008). Furthermore, it allows divergence and follow-up questioning, whereby new information raised by individual patients is, in turn, included in future interviews. Questions for the topic guide in the current study were developed by the research team taking into account the opinions and suggestions of specialist practitioners in the orthodontic clinic at BLH. The topic guide was tested in four pilot interviews, before being used in the final test sample to ensure that it would generate constructive data by examining and comparing emerging themes from the interviews in terms of their consistency and frequency. This also enabled testing of the recruitment strategy and allowed one author (FAAJ) to fully develop their interview skills. All interviews were conducted by this investigator who attended a qualitative training skills course at King's College London prior to commencing the study.

Patient recruitment for the main study was carried out in a separate sample until the point was reached when no further new themes or data emerged, in terms of the effect of orthodontic treatment on dietary intake and behaviour. This point was reached after 10 interviews had been undertaken. All interviews were recorded and immediately transcribed verbatim by a transcription agency (Transcript Divas, Hounslow, Middlesex, UK).

Analysis of the interviews

The interviews for the 10 patients, in the main study sample, were manually analysed, coded, and compared during data collection and on completion. Any new emerging themes

were identified and used in subsequent interviews. Data analysis adopted the principles of framework analysis, in which the information and themes derived from the analysis were independently coded by two investigators (FAAJ and SJC). The resultant coded category system proposed by both researchers was similar and, following discussion, two main themes were identified: pain experience and dietary behaviour change. These findings were subsequently assessed for comprehensiveness and validity by inviting a further four adolescent patients, who were also undergoing fixed appliance treatment, to be interviewed in relation to their experiences.

Results

In addition to the two major themes identified from the interviews, a number of sub-themes were introduced, on the basis of the information generated from the interviews. This permitted further exploration of each theme in terms of its frequency of occurrence and severity of effect, providing a greater insight into the effects of appliance treatment.

Direct quotations from the interviews for each theme are reported in Appendix 1.

Patient experiences relating to pain

This theme was subdivided into pain experience, duration, intensity, site, use of analgesics, and timing.

All patients reported pain and discomfort during the first few days after appliance placement, after which it lessened and patients adapted to the discomfort. Pain duration ranged from 1 day up to 2 weeks. However, seven patients reported that pain levels decreased during the first few days and only three patients reported a longer duration of pain. Varying degrees of pain level were reported ranging from mild to severe. In some cases, the pain was intolerable and frustrating. Three patients reported taking analgesics.

The site of the pain in the mouth was variable but mainly localized to the teeth. Three patients reported pain in the soft tissues (cheeks and gums). Seven patients reported that pain was most severe in the mornings. The remaining three patients reported pain throughout the whole day and/or when eating hard food.

Patient experiences relating to dietary changes

This theme was divided into difficulties in eating and chewing, amount of food eaten, food items that could not be eaten or were eaten more, changes in dietary behaviour due to their orthodontist's advice, and impacts on health.

Nine patients reported difficulty in eating hard foods, particularly in relation to biting and chewing. Three patients reported difficulties and discomfort due to food getting stuck in their brace. All patients stated that their diet had altered as a result of treatment and they were eating less,

changing what they ate, or the method of food preparation (i.e. cutting food into smaller pieces). The most common food items patients reported avoiding were apples, carrots, crisps, chocolate bars, meat dishes, nuts, toffees, chewing gum, crackers, and corn on the cob. The majority of patients moved to a soft diet because it was easier to chew and less painful. The most common food items that were consumed in greater quantity/frequency were mashed dishes, rice, pasta, bananas, soups, cheese, water, juices, boiled vegetables, and milk.

Eight patients reported being influenced by the dietary instructions given to them by their orthodontist and as such avoided eating sweet foods, toffee, chewing gum, and fizzy drinks. Seven patients reported that their diet was healthier due to eating fewer snacks, eating healthier food by avoiding high sugar content foods, and maintaining good oral hygiene.

Discussion

Few studies have assessed the impact of orthodontic treatment on dietary intake and behaviour and are limited by the recruitment of ill-defined samples, unclear methodological design, a lack of control groups, and invalid dietary assessment techniques (Cheraskin and Ringsdorf, 1969a,b; Riordan, 1997). Furthermore, methods of assessing dietary intake are complex and associated with respondent errors (Bingham, 1991). Therefore, adopting a qualitative method should elicit important aspects related to the patient's perspective of their diet and identify factors that can influence dietary behaviour change.

The present qualitative study is the first to explore the potential impact of fixed appliance treatment on dietary intake and habits. Patients undergoing fixed treatment experience varying degrees of pain and discomfort with pain intensity being highest during the first week after placement of the appliances and then declining (Sergl *et al.*, 1998; Bergius *et al.*, 2002). Few reports have found that pain lasts for longer periods (Brown and Moerenhout, 1991). Both findings were supported by the present study.

Regarding dietary intake, the majority of patients reported difficulty in eating and chewing due to pain and this resulted in eating a softer diet in preference to hard food types. This is in agreement with previous research (Brown and Moerenhout, 1991), however, the present study also identified which food items were particularly difficult to eat. A further reason for dietary change identified was the fact that some food types became 'stuck' in the appliance with resultant difficulty in maintaining good oral hygiene. Perhaps not surprisingly, one of the most frequently stated reasons for dietary change was the influence of dietary instructions given by the orthodontist. Among the main instructions given were to avoid eating hard and high sugar content foods.

A clear finding was the reported change in food types/consistency. The most common food items which were reported as being difficult to eat were: apples, carrots, crisps, chocolate bars, meat, nuts, toffees, gums, crackers, and corn-on-the-cob. Patients reported changing to softer foods such as mashed dishes, rice, pasta, bananas, soups, cheese, water, juices, boiled vegetables and milk.

An interesting finding was the fact that although patients reported difficulty in eating and chewing due to the amount of pain and discomfort experienced, they felt that their eating habits were healthier compared with pre-treatment. Patients reported eating fewer snacks, eating healthier food and avoiding high sugar content foods.

With respect to the qualitative approach adopted in this study, there are limitations. The results may have been influenced by the one-to-one contact between the patient and the researcher and the alternative use of focus groups may have yielded an interactive effective approach (Kennedy *et al.*, 2001). However, an attempt to conduct focus group interviews proved too difficult logistically in terms of arranging follow-up appointments at the same time for patients being treated by a number of different clinicians. While the number of patients interviewed in this study was small, recruitment was continued up to the point when no new themes arose. This is a common approach in qualitative research (Ryan *et al.*, 2009).

While validity and reliability in qualitative research are important, there are two opposing views. The first applies the concepts used in quantitative research but with different methods to take into account the goals of qualitative research. The second argues that qualitative research should not be judged by the same conventional methods used in quantitative research (Mays and Pope, 2000). The most popular methods used in qualitative research are respondent validity, reflexivity, and fair dealing (Mays and Pope, 2000). In the present study, respondent validity, i.e. comparing the investigator's findings with those of the research subjects, was achieved by discussing the findings of the main study with a separate group (two males; two females) of adolescents undergoing fixed appliance treatment aged 11–14 years and assessing whether they agreed that these findings reflected their own experiences.

Reflexivity assesses whether the findings of the study might have been influenced by personal and/or intellectual bias. This was addressed by the principle investigator conducting a number of patient interviews prior to commencing the current study, in order to familiarize himself with the interview process and to learn to ask standardized questions in an open and non-leading manner. Fair dealing was achieved by recruiting patients of different ages, genders, and ethnic backgrounds to take account of the diversity of dietary intake (Herne, 1995).

The findings of the present qualitative study revealed that patients undergoing fixed appliance treatment experience changes in their dietary intake that should not be

underestimated and this necessitates further investigation in a large population study. However, these dietary changes appear to have potential benefits as the majority of patients felt that they had adopted healthier eating habits, as a result of treatment.

Conclusions

1. The present study identified factors that influence dietary intake in patients undergoing fixed appliance treatment.
2. Patients reported adopting a healthier diet as a response to fixed appliance treatment.
3. The findings highlight the need to further explore dietary changes in response to fixed orthodontic treatment in a larger population base.

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Appendix 1

Direct quotations for each theme and sub-themes identified from the study. Each quotation is followed by the letter ‘P’ and a number to identify each coded patient.

Patient experiences related to pain (pain experience, duration, intensity, site, use of analgesics, and timing).

‘Yes, on the first day it really hurt, on the 2nd, 3rd and 4th day I started to get used to it but you still can feel little aches sometimes’ (P2).

‘Hurtful. I get swellings in my gums. So, I feel very angry because I can’t do anything about the pain’ (P9).

‘The back teeth where the wire goes through, kept scratching my cheeks. Yes, that’s the only part mostly’ (P8).

‘Yes, I had to take Nurofen because it was hurting me’ (P4).

‘After you get the braces you get the pain early in the morning when you wake up. Your jaw really hurts in the morning’ (P4).

Patient experiences relating to dietary changes (difficulties in eating and chewing, amount of food eaten, food items that could not be eaten or were eaten more, changes in dietary behaviour due to their orthodontist’s advice, impacts on health).

‘I can’t eat any hard foods. I can only have soft foods’ (P3).

‘Yes, a lot, because I can’t chew properly. I can’t swallow. It affects my diet’ (P9).

‘Potato chips, crisp, chewy food and hard crunchy food. Hard vegetables have to be boiled’ (P4).

‘I eat more soups. I never used to like soup, but now when I feel hungry I eat soup’ (P8).

‘Yes. She gave me a list of instructions and I follow them because I don’t want to damage my teeth such as stains.’ (P8).

‘Yes, my diet has changed because I have to eat softer foods, but it’s better. I don’t eat a lot of junk foods because it gets stuck’ (P4).