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A Scoping Review of the Implications of Adult Obesity in the Delivery and Acceptance of Dental Care.

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Abstract:

Background: Due to the increasing prevalence of obesity within the general population it is presumed that the prevalence of overweight and obese adults accessing dental services will also increase. For this reason dentists need to be aware of implications of managing such patients.

Methods: A scoping review was carried out. Both Medline via OVID and Scopus databases were searched along with grey literature databases and the websites of key organisations. Inclusion and exclusion criteria were established. The data were collected on a purpose-made data collection form and analysed descriptively.

Results: The review identified 28 relevant published articles and 2 relevant items of grey literature. Following review of this literature three themes relating to adult obesity in the delivery and acceptance of dental care emerged; clinical, service delivery and patient implications. The majority of the papers focused on the clinical implications.

Conclusion: On the topic of adult obesity and dental care, the majority of published and grey literature focuses on the clinical implications. Further research is needed on both the patient's perspectives of being overweight or obese and the delivery and acceptance of dental care and the service delivery implications.

Key words: Obese, Obesity, Overweight, Dental

Background

Obesity is defined as an abnormal or excessive fat accumulation that may impair health [1] and it is most commonly measured by calculating an individual's body mass index (BMI) [2]:

$$\text{BMI} = \frac{\text{Weight (kg)}}{}$$

[Height (m)]^2

Adults are defined as overweight if they have a BMI score of 25kg/m^2 – 29.9kg/m^2 and obese if they have a BMI score of 30kg/m^2 or more (2).

The prevalence of adult obesity in the UK is increasing. Between 1993 and 2011 the population of obese adults nearly doubled. In 1993 13% of men and 16% of women were obese, this rose to 24% of men and 26% of women in 2011 [2]. Data from the Health Survey for England 2014 highlighted that the prevalence of obesity is highest in the group between 55 years and 64 years of age, with 33.1% of men and 31.4% of women being obese [3]. The prevalence is predicted to continue to rise to 60% of men and 50% of women becoming obese by 2050 [4].

Due to the increasing prevalence of obesity within the general population it is presumed that the prevalence of overweight and obese adults accessing dental services will also increase [5]. For this reason dentists need to be aware of implications of managing such patients. Previous studies have attempted to determine the dental need of overweight and obese adults [6,7,8]. Other authors have identified the challenges faced by clinicians when trying to provide safe dental care to this patient group [9,10]. These individual publications are helpful in increasing the clinicians knowledge of aspects associated with adult obesity in the delivery of dental care, however alone they are unable to identify and synthesise the broader implications of managing this patient group.

In an effort to prepare dental professionals for the increasing need to manage overweight and obese adult patients this scoping review aims to describe the current literature related to the implications of adult obesity in the delivery and acceptance of dental care and identify gaps which would benefit from research in the future.

Method

A scoping review was conducted based on the methodology described by Arskey and O'Malley [11]. Scoping reviews are increasingly being carried out when little is known about the subject of the research question. A significant advantage of scoping reviews is that they plan for an iterative process when establishing inclusion and exclusion criteria. This allowed the authors to keep the search as broad as possible until relevant themes emerged and could be further explored.

The research question was:

What are the implications of obesity in the delivery and acceptance of dental care for adults?

For the purpose of this study subjects were defined as those aged 19 years and older who were classified as either overweight or obese according to a BMI calculation.

Relevant published and grey literature was identified via literature searches. The Medline via Ovid database was searched using the medical subject headings of 'obesity AND dental care' and 'overweight AND dental care'. The search was limited for age (19 years and older). Keyword searches were conducted within Scopus using 'obesity AND dental care AND adults' and 'overweight AND dental care AND adults'. Both database searches were limited to English language abstracts.

Open Grey, Ethos and Nexis grey literature databases were searched using the same keyword search as that used in the Scopus database.

The websites of key organisations were also searched for relevant literature, using the keyword searches described above. The organisations included; the British Dental Association, the British Association for the Study of Community Dentistry, the British Society of Disability and Oral Health, the National Institute for Health and Care Excellence, the Scottish Dental Clinical Effectiveness Programme, NHS England and the Obesity Action Coalition.

There was no restriction on study design or date of publication. Relevant articles were selected according to the following inclusion criteria:

- Aim of the study focused on both dental care and obese or overweight individuals.
- Principally focused on the adult population (>19 years old).
- Article available in English.
- All grey literature accepted, as defined by GreyNet International [12].

Articles identified through the electronic searches were manually de-duplicated. The remaining list of full articles, titles with abstracts, were reviewed by the authors during a screening meeting. The articles were marked as either potentially relevant or not relevant, according to the inclusion criteria. All potentially relevant articles were read in full and further reviewed as being relevant or not relevant.

Initial themes were identified from the relevant articles and incorporated into a data extraction spreadsheet. This spreadsheet allowed for data analysis using a framework approach [13]. The headings of the data extraction spreadsheet were:

- Publication number
- Author(s)
- Year of publication
- Title of publication
- Source of publication
- Country of lead author
- Type of study design
- Implications of adult obesity in the delivery and acceptance of dental care

The initial themes were discussed and refined by both authors into appropriate subthemes. Data were coded according to the themes and subthemes, all data with the same code was then extracted and summarised descriptively.

A template of the data extraction spreadsheet is available from the authors if required.

Results

The Medline via Ovid and Scopus database searches produced a total of 223 results. Seventy four of these were duplicates. Of the remaining 149 results, 83 were excluded as they did not meet the inclusion criteria. A total of 66 published articles were read in full and a further 37 were excluded. The excluded full text articles did not meet the inclusion criteria, specifically they did not discuss a link between obesity or overweight and dental care. One further article was excluded as it was found not to be available in English. A flowchart of the literature searches from Medline via Ovid and Scopus databases is provided in Figure 1. Searching the grey literature identified two relevant patient information leaflets produced by the Obesity Action Coalition. The bibliography of the 28 published articles and 2 pieces of grey literature included in this scoping review are available from the authors if required.

The relevant articles spanned a time period from 1997 to 2015. Over a third of the articles were published in America. All of the published articles were categorised as having a low level of evidence, according to the Centre for Evidence Based Medicine [14].

Regarding the implications of adult obesity in the delivery and acceptance of dental care, three main themes emerged from the published and grey literature. These were; clinical implications, service delivery implications and patient implications. The initial themes were reviewed and refined by both authors to produce relevant subthemes which are summarised in Table 1.

Clinical implications:

Dental disease:

Periodontal disease:

Thirteen of the 30 articles discussed the potential association between being obese or overweight and the development of periodontal disease. These 13 articles included two case-control studies, two longitudinal surveys, five cross-sectional surveys, one review article, one case report and two patient information leaflets.

The majority of articles that related to obesity and periodontal disease suggested an association between the two, specifically noting obesity as a risk factor for periodontal disease[15-25] however not all the published articles found a significant association [7,26].

One article stated that people who had been obese for over 6 years were most at risk [20], however other authors implied a more dose-dependent effect, stating that those with the highest BMIs had the highest risk of periodontal disease [21]. The relationship between obesity and periodontal disease has been acknowledged as associative however there is no evidence of a causal relationship. One theory of this association is that the chronic systemic

inflammation present in obesity may increase a person's susceptibility to periodontal disease [21].

Dental caries

Five of the 30 articles addressed whether or not obese and overweight adults had higher rates of dental caries. These articles included a cross-sectional survey, a longitudinal survey, a case-control study, a case report and a patient information leaflet [24]. The cross-sectional survey and the case control study found no significant association between being obese or overweight and an increased caries rate [23,27]. The longitudinal survey, which had assessed the dental health of obese and overweight teenagers into adulthood found that the obese or overweight 20 year olds had statistically significantly higher caries rates compared with normal weight individuals [28]. The case report highlighted that obese patients who undergo bariatric surgery are at higher risk of dental caries post-operatively due to the change in diet, specifically to a 'grazing' diet of eating frequent small meals [16].

Reduced number of teeth

Seven of the 30 articles discussed the associations between obesity and the number of remaining teeth. Six of these articles support the argument that obese adults have fewer teeth compared to normal weight individuals [24,26, 27,29, 30,31], however a case control study found no significant difference between the number of teeth in normal weight and obese individuals [23]. Two of the articles quote the significance of having less than 21 teeth which is thought to increases a person's risk of obesity. Again this is an associative relationship and there is no evidence of a causal link.

Xerostomia

Two articles suggest that people who are obese may have xerostomia either because they are taking appetite suppressants [32], or because they have undergone bariatric surgery [33].

Poor wound healing

One article implied that nutritional deficiencies in obese and overweight adults who have undergone bariatric surgery may impair wound healing [16].

Erosion

Three articles discussed obesity and dental erosion. One suggested young adults with dental erosion were more likely to be obese [28], the other two highlighted that obese patients who have undergone bariatric surgery are at increased risk of dental erosion due to the common side effect of bariatric surgery; reflux and vomiting[16,34] .

<u>Concurrent medical comorbidities</u>

Five of the 30 articles addressed the fact that overweight and obese individuals are at an increased risk of concurrent medical comorbidities, which require managing simultaneously to the dental treatment [16,17,35,36,37]. The fact that obesity is part of metabolic syndrome was discussed across the articles and it was highlighted that people with metabolic syndrome are at an increased risk of type 2 diabetes mellitus and cardiovascular disease [17,37].

In addition to the systemic comorbidities the articles also described the physical comorbidities which have an impact on the dental management of overweight and obese patients. It is recognised that obese adults are at risk of sleep apnoea, which itself is a contraindication to dental sedation in a primary care setting [35]. People who carry weight on their chest and upper body are at risk of hypoxaemia when lying flat, in extreme circumstances some obese patients may present with Obesity Hypoventilation Syndrome, which is a result of chronic hypoventilation due to the excess weight preventing full expansion of the lungs [36].

Service delivery implications:

Dentist's role in weight management

Six out of the 30 articles discussed that dentists should have a role in their patient's weight management in the future if they do not already. Of these six articles, two were opinion papers[37,38] and four were cross-sectional surveys [22,27,39,40].

The common message across these papers was that general health care and oral health care should occur in parallel, therefore allowing common risk behaviours to be targeted. The articles suggest that dentists could receive additional training, which may begin at the undergraduate level, in order to enable them to monitor their patient's risks of developing chronic medical conditions. One of the articles discussed the practicalities of offering such a service to patients and suggested ways in which this service could be presented to patients [37]. A cross-sectional survey of patients carried out in the UK in 2012 was designed to establish whether people visit their dentist more regularly than the GP. It was found that 15.3% of people who see their dentist every 2 years or more see their GP less frequently, and of these 32.1% were overweight and 7.3% were obese [40]. A cross-sectional survey of dentists carried out in the USA in 2010 was designed to establish dentist's attitudes of their role in weight management of their patients. From this study the majority of dentists were not interested in delivering weight management monitoring or advice until a definitive link between overweight or obesity and dental health had been established [22].

Additional service delivery considerations

Increased appointment times

Two of the articles described how overweight and obese patients require longer appointment times compared with normal weight patients. The two main reasons for this were because overweight and obese patients are less mobile; therefore it can take them longer to get from the waiting area to the dental surgery and the other reason was because the extra weight around the face can obstruct the access to the mouth and make the dental procedure more complicated and therefore the operating time increases [35,36]. The authors of both these papers highlighted that these longer appointment times reduce the efficiency of the clinic and therefore reduces the clinics income.

Specific equipment required

Three of the articles highlighted that obese and overweight adults may not physically fit within a standard dental chair, one of these articles was a patient information leaflet [24]. The other two articles recommended that additional equipment was required to overcome the fact that standard dental chairs, monitoring cuffs and wheelchairs are unsuitable for some overweight and obese adults [35,36].

Staff implications

Three of the articles addressed the fact that treating overweight and obese adults in a dental setting does have implications for the staff involved. The specific issues raised were that staff often require more administration time to liaise with other medical or social care teams prior to the provision of dental care [16], staff are at risk of physical strains due to the need to adopt poor postures to reach the oral cavity of overweight and obese adults [35]and [36] finally the risk that staff are at risk of increased mental stress managing this group of patients with compromised airways [35,36].

Sedation in specialised units

Two articles discussed the fact that overweight and obese adults are not suitable for conscious sedation in a standard dental clinic. This was because overweight and obese adults can be extremely difficult to cannulate due to the excess tissues [35]. Also overweight and obese adults have compromised airways which require specialist teams to be able to manage in an emergency with the appropriate resuscitation equipment [36].

The articles emphasised that even within a specialised unit overweight and obese adults are high anaesthetic risks given their complicated airways and reduced lung capacity. The articles stated that delayed recovery from general anaesthetic is a recognised risk for overweight and obese adults due to pulmonary atelectasia [36].

Patient implications:

Dental anxiety

Two of the articles highlighted that obese patients have anxieties associated with dental visits. A case-control study found that obese women reported significantly more dental anxiety compared with normal weight women when using the Dental Fear Survey (DFS) questionnaire [29]. The DFS questionnaire comprises of 20 items on a response scale ranging from 1 = no fear to 5 = extreme fear, and the sum of the scores varies between 20 and 100. A score ≥ 65 was used to indicate dental anxiety. The authors identified that the level of anxiety increased with the increasing BMI. A patient information leaflet also recognised that obese patients will often fall into a cycle of symptom driven dental care rather than being regular attenders due to anxiety and embarrassment [24].

Decreased dental attendance

Six of the thirty articles discussed the dental attendance rates of overweight and obese adults. These articles include three cross-sectional surveys, two case control studies and a case report. Five of the articles state that overweight and obese patients visit the dentist less frequently than normal weight individuals [16, 27, 29, 41, 42]. One of the cross-sectional surveys found no statistical link between obesity and decreased attendance for regular dental check-ups [43]. The case report found that dental attendance increased following bariatric surgery [16].

Self-perceived poor oral health

Four of the thirty articles refer to patients opinions regarding their own oral health. These articles include three cross-sectional surveys and a case-control study [18, 26, 27, 42]. The case-control study found that overweight and obese adults were more likely to report their dental status as unhealthy compared with normal weight subjects. The three cross-sectional surveys found that overweight and obese adults reported having dry mouths [27], a lack of use of interdental cleaning aids [26] and having poor oral health and fewer teeth, compared with normal weight individuals after controlling for socioeconomic factors [18].

Discussion

The aim of this study was to explore the breadth of evidence related to the implications of obesity in the delivery and acceptance of dental care in adults and specifically identify themes within the existing literature and any gaps from the literature which would benefit from further research. The review identified themes within the existing research and has highlighted that there is a paucity of evidence related to patient perspectives and service delivery implications regarding the provision and acceptance of dental care. A summary of the identified gaps in evidence are listed in Table 2. The main strengths of this review include the scoping review methodology and comprehensive reproducible search strategy. However, the review was limited by the two databases that were searched and the fact that this scoping review focused on the adult population. Further research is also needed with regards to the delivery and acceptance of dental care in obese and overweight children.

Only two of the relevant articles were written by authors from the UK. Given the current attention that obesity receives in the UK media it is surprising that so little research has been carried out into the dental management of overweight and obese adults.

As discussed all the articles included within the review were of a poor level of evidence, this may be because the subject material cannot be adapted to more robust research methods or the fact that there is a lack of funding for such research methods on this subject.

The majority of the articles focused on the clinical implications of dental disease and overweight or obese patients with most of these articles implying that this group of patients are more at risk of periodontal disease and dental caries. However, the aim of the scoping review was to describe the literature related to the implications of adult obesity in the

delivery and acceptance of dental care, rather than to focus on the association between obesity and dental disease.

In addition to dental disease dentists must be are aware of the additional medical comorbidities that overweight and obese patients can present with. These additional medical comorbidities, such as diabetes and cardiovascular disease, can increase the risk of a medical emergency in the dental surgery and therefore dentists need to ensure that their medical emergency training and equipment is appropriate for the management of overweight and obese patients.

Currently, in the UK, no research has been published regarding the opinions of dentists or patients regarding the dental team's role in weight management. This review highlights that there is a body of evidence to suggest that dentists could be well placed for the delivery of basic weight management advice or to signpost patients to local services, using a similar protocol to that used for the delivery of smoking cessation advice. Such research could help identify whether there is a possibility of dental teams referring patients to weight management services in their local areas.

With the ever increasing population of overweight and obese adults it is inevitable that some dental services will need to invest in the specialised equipment to provide a service to those unable to accept treatment in a standard dental chair. However, this specialised equipment is expensive, requires more surgery space and presents challenge for dental teams to use. In addition, accessibility of dental clinics themselves must also be considered in terms of facilities for patients who are unable to walk such as mobility scooters, use of bariatric ambulances and the need for domiciliary care for patients confined to their homes.

Within this review, the number of articles focused solely on the patient implications of being overweight or obese and the delivery of dental care was disappointingly low. The current strategy in the NHS is for patient driven care [44] , therefore it would be beneficial if qualitative research was conducted with this patient group to ascertain whether or not they perceived any barriers to dental care and how best to maintain their dignity. These barriers can then be addressed by commissioners and existing services to better accommodate this group of patients. Additional research is required into the attitudes of the dental team to providing dental care for patients who are obese and the opinions of staff who are currently using the bariatric dental equipment.

Conclusion

There is increasing need for appropriate dental management of adults who are overweight and obese. It is important that clinicians recognise the implications of obesity in the delivery of dental care and prepare themselves for the challenges that will present with this group of patients.

The literature encourages dentists to be aware of the upcoming challenge of managing this group of patients however it is extremely difficult to adapt an existing service or plan a new service for the dental management of obese adults without an understanding of what it is that this group of patients see as barriers to the existing service.

More research is needed to establish the patient's perspective of the implications of obesity and acceptance of dental care.

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Table 1: Themes and subthemes identified within the existing literature relating to implications of obesity in the delivery and acceptance of dental care for adults.

Clinical implications	Service delivery implications	Patient implications
Dental disease • Periodontal disease • Dental caries • Reduced number of teeth • Xerostomia • Poor wound healing • Erosion	Dentist's role in weight management Additional service delivery considerations • Increased a:ointment times • Specific equipment	Dental anxiety Decreased dental attendance Self-perceived poor oral health.

Concurrent medical comorbidities	required • Staff implications • Sedation in specialised units	

Table 2: Gaps identified within existing literature relating to implications of obesity in the delivery and acceptance of dental care for adults

Gaps within existing evidence
1. Qualitative evidence relating to overweight and obese patient's opinions regarding access to dental care. 2. Qualitative evidence relating to the professional's opinions and attitudes of managing overweight and obese adults. Specifically: o Opinions of dentists regarding their role in weight management of their patients. o Evidence from dentists currently providing dental treatment within bariatric dental facilities.