

Acceptability of Hall's Technique: A Review

Fabiha Jesmin¹, Aimi Kamarudin¹, Fadzlin Baharin¹, Wan Muhamad Amir Wan Ahmad², Mahmud Mohammed³

¹Paediatric Dentistry Unit, ²Biostatistics Unit, ³Oral & Maxillofacial Radiology Unit, School of Dental Sciences, Health Campus, Universiti Sains Malaysia, Kubang Kerian, 16150, Kota Bharu, Kelantan, Malaysia

Abstract

Aim: Hall's technique (HT) has been established as a novel method for managing decayed primary molars. Despite good evidence of its effectiveness, the acceptability of HT among paedodontists, general dental practitioners, and undergraduate students are still noticeably low. The aim of this study was to review the available studies systematically by assessing the acceptability of HT under different experimental populations. **Materials and Methods:** A search was performed using three databases, Scopus, PubMed, and Google Scholar, published from 2003 to 2018. The keywords used in the search were "HT," "preformed metal crown," "acceptability," and "primary molar." After the relevant articles were found, the critical appraisal was made to select those that were suitable for the systematic review. The inclusion criteria of the study were surveys, clinical studies, no sample size restrictions, and only English language papers. Any conference abstracts, case reports, and unpublished data were excluded from this study. **Results:** On the basis of the keywords, 26 relevant articles were found and of those, 11 articles were selected for the systematic review. **Conclusion:** On the basis of the results of this study, it can be concluded that clinical trial can be an effective tool to assess the usage and acceptability of HT along with the questionnaire. Furthermore, there should be more questions, which can give information regarding the HT in children with special needs. Moreover, the study on the acceptability of HT could be conducted on other populations rather than Europe to evaluate the use rate of HT and its acceptability toward other regions.

Keywords: Acceptability, Hall's Technique, Preformed Metal Crown, Primary Molar

Received: 25-11-2019, **Revised:** 08-01-2020, **Accepted:** 08-01-2020, **Published:** 28-03-2020

INTRODUCTION

Since 1950, preformed metal crown has been used in children's dentistry for managing carious primary molars.^[1] The crown design has been improving regarding the morphology of the primary molars and the fitting procedure of the crown. Hall's technique (HT) has been established as a novel method for managing decayed primary molars. A general practitioner, Dr. Norna Hall, has been treating carious primary molars with the preformed metal crown in an unconventional way, not using local anesthesia, removing caries or preparing the tooth.^[2] The prime success of HT depends on sealing caries with a preformed metal crown. By opposing microorganisms from their source of dietary carbohydrate and nutrition prevent the advancement of caries.^[3,4] The dental pulp is then able to regenerate the reparative

dentine. For preventing pulp exposure, the advantage of incomplete caries removal was discussed in a recent study.^[5]

High caries experience in early life increases the risk of caries in adulthood.^[6] Ludwig *et al.*^[7] conducted a retrospective study on the success of stainless-steel crowns (SSCs) placed with HT. They evaluated the success rate by clinically and radiographically of SSCs placing following HT and traditional methods as well. They graded the restoration success by using a 4-point scale based on the

Address for correspondence: Dr. Aimi Kamarudin,
Paediatric Dentistry Unit, School of Dental Sciences,
Health Campus, Universiti Sains Malaysia, Kubang Kerian, 16150,
Kota Bharu, Kelantan, Malaysia.
E-mail: draimi@usm.my

Access this article online

Quick Response Code:



Website:
www.jioh.org

DOI:
10.4103/jioh.jioh_312_19

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: reprints@medknow.com

How to cite this article: Jesmin F, Kamarudin A, Baharin F, Wan Ahmad WA, Mohammed M. Acceptability of Hall's technique: A review. J Int Oral Health 2020;12:95-101.

presence or loss of SSC and whether the patient needed further treatment associated with pulpal pathology or secondary caries. The study result showed that 65 (97%) of 67 SSCs placed with HT and 110 (94%) of 117 placed with the traditional method were successful. A large prospective, randomized controlled clinical trial will be needed to compare these two modalities to determine the result whether they significantly different rates of restoration success.^[7]

The HT is now broadly used in developed countries such as the UK, the USA, and Germany.^[2] Research evidence has indicated that the HT is effective in managing dental caries in primary molars and it is more satisfactory to the patients and their parents in comparison to other restorative methods.^[8] In a previous study, HT was chosen as a treatment option for anxious children. For children who were not anxious, it was chosen as the treatment of choice.^[9] There has been a study on the views of the general practitioner on the use of HT where they found that 48% were using HT and those who never used HT which is 51% were interested to adopt the technique for managing carious primary molars.^[10] Nowadays, pediatric dentists in the UK are using HT frequently in their daily practice.^[11]

Reviewing all questionnaires, we found that the questionnaire was mostly about the usage of HT; they did not give any information regarding children with special needs as well as parent's acceptability regarding the treatment cost. The prime aim of this study was to conduct a systematic literature review of recently published papers on HT among different population groups and different areas to evaluate the acceptability of HT.

MATERIALS AND METHODS

Study design

No registration was conducted for this systematic review. Preferred Reporting Items for Systemic Reviews and Meta-Analyses (PRISMA) 2009 guidelines (<http://www.prisma-statement.org/>) was followed to perform this review. Literature search has been performed independently in three different databases, PubMed (end of searching on August 18, 2019), Google Scholars (end of searching on August 21, 2019), and Scopus (end of searching on August 28, 2019) by two review authors (FJ and AK). Search terms used were “preformed metal crown,” “HT,” “acceptability,” and “primary carious molar.” At first, two different authors (FJ and AK) were independently analyzed the selected articles according to titles and abstracts, which were related to this study. To avoid missing any related articles during the initial search, we have analyzed the references of the selected studies. Duplicate and cross-referenced studies were removed, records were screened according to inclusion and exclusion criteria, full-text studies were assessed for eligibility, and qualitative synthesis was carried out.

Searching criteria

The literature search included the papers published from 2003 to 2018. The inclusion criteria of the study were clinical studies, surveys, no sample size restrictions, and only English language papers. Any conference abstracts, case reports, and unpublished data were excluded from the study.

The modified Downs and Black checklist [Table 1] was carried out to assess the risk of bias for the selected studies by the same reviewers (FJ and AK).^[19] Five principal segments were classified to assess each study. The segments are coverage, internal validity-bias, internal validity-confounding, external validity, and power. If any of the criteria were fulfilled, 1 point was given for each study. However, 0 points were given to those studies that were not fulfilled any of the respective criteria. Alternatively, for assessing the power of each study, 1–5 points were scaled, if the sample size of the study was carried out by using power, 1 point was given and if not 0 points was given. This additional assessment was carried out to evaluate the clinically significant effect of the study.

Observational and considerable parameters

Of 27 points, articles that scored less than 17 indicated the presence of limitation in methodology. We have extracted the data from each study according to the PICOS guideline, which included the sample size with the number and population involved, type of methods used for measuring the acceptability, location and duration of the study, and results within general outcome [Table 2]. In addition, two different reviewers (FJ and AK) extracted independently all the data. All the disagreements were solved in a mutual discussion by consulting with the third reviewer (FB). The whole process was performed unblinded. For any relevant articles to check the publication bias or selective studies, hand searching was also carried out in the library. The primary outcome measure for assessing the acceptability of HT was the rate of using HT among the dentists. The secondary outcome measures were the prognosis of HT. We also sought to extract information related to the cost-effectiveness of interventions.

RESULTS

The selection procedure for the selected studies was conducted by searching different databases followed by PRISMA 2009 guidelines and was given in a flow diagram [Figure 1]. Of 176 articles, 16 abstracts were recruited. These 176 articles were found through the databases. Finally, 11 studies were selected for the review. Five articles were rejected because of case reports, pilot studies, and incomplete data. Among the 11 included studies, nine of them were questionnaire-based study^[2,9-11,17,13,15,18,12] and only two studies were a randomized control trial.^[18,19] All

Table 1: Downs and Black checklist

	Threlfall <i>et al.</i> ^[12]	Foley ^[9]	Innes <i>et al.</i> ^[2]	Bell <i>et al.</i> ^[13]	Dean <i>et al.</i> ^[10]	Gilchrist <i>et al.</i> ^[14]	Page <i>et al.</i> ocationmissing publisher cityec ^[15]	Santamaria <i>et al.</i> ^[16]	John ^[17]	Roberts <i>et al.</i> ^[11]	San- tamaría <i>et al.</i> ^[18]
Reporting	7	6	5	9	8	6	7	8	7	7	8
External validity	3	3	2	3	3	3	1	1	2	3	3
Internal validity	7	10	4	6	7	6	5	8	7	10	9
Power	1	1	1	0	1	1	1	1	0	0	1
Total score	18	20	12	18	19	16	14	18	16	20	21

the published articles were English language-based. From a total of 26 papers from different databases, 11 papers fulfilled the inclusion criteria. We did not find any papers by hand searching.

Seven of 11 studies that scored 17 and above were categorized as high quality.^[9-11,16,13,18,12] Furthermore, 3 studies that scored 14 and above were categorized as fair quality.^[17,14,15] Lastly, one study that scored 12 was categorized as low quality.^[2] The pivot chart for the risk of bias assessment is given in Figure 2. No studies were found to assess the acceptability of HT in children with special needs. Acceptability regarding the treatment cost of HT was not mentioned in any previous study. In addition, no clinical trial was carried out on the HT outside of Europe. Ten of 11 studies provided positive results regarding the acceptability of HTs,^[2,9-11,17,14,13,15,18,12] whereas one study provided negative results regarding the acceptability of HT among pediatric dentists and general dentists, which were carried out outside of Europe.^[16] All the included studies assessed the acceptability of HT and its future impact to manage primary carious molars. The most common data collection tool for estimating the acceptability of HT was a valid questionnaire. Most of the studies mentioned that the acceptability of HT was higher among the dentists, parents, and children.^[2,9-11,17,14,13,15,18,12]

DISCUSSION

Inclusion criteria were maintained strictly for minimizing the chance of missing any significant study relevant to our search. Publication year limitations were present in this study. In addition, the search was also limited to the English language and for the sample size, there were no limitations. Despite all the measures, in total 11 potential studies were eligible according to the inclusion criteria. HT is one of the successful treatment options for occluso-proximal carious lesions in the primary dentition. It has been already proven that HT is a novel method for managing carious primary molars. Moreover, there is no specific treatment for managing decayed primary molars. It varies from child to child, parents to parents, and dentists to dentists as well it depends on a certain situation. Because of this the use rate of HT and its acceptability toward the general dental practitioners (GDPs) and pedodontists are not the same. Among the selected studies, we found that only 2 of 11 studies were conducted on pedodontists, four studies conducted on GDPs, three on children and their parents, and one on the final-year undergraduate students. Although most of the study results showed that HT is preferred for managing asymptomatic carious primary molars, the sample population is not the same. We know that mostly the pedodontists are using HT routinely in their regular practice. In a study of Van der *et al.*,^[20] we found that the HT caused “no discomfort” to “mild discomfort” in 89% of the cases as compared to 78% with respect to

Table 2: Summary of extracted data from selected study

Authors year of publication	Sample size	Population	Area	Method	Result
Threlfall <i>et al.</i> , 2005 ^[12]	100	GDPs	Lancashire, Cheshire, and Greater Manchester	Interview	7% GDPs stated that they would fit SSC and 18% had ever fitted SSC in general practice
Foley, 2010 ^[9]	59	Postgraduate pediatric dentists	United Kingdom	Online survey	The HTPMC preferred for managing asymptomatic carious primary molars by most of the respondents
Innes <i>et al.</i> , 2010 ^[2]	17	GDPs	United Kingdom	Interview along with questionnaire	13 of 14 GDPs stated that they would use HTPMC routinely
Bell <i>et al.</i> , 2010 ^[13]	98	Children and parents	United Kingdom	Questionnaire	The study revealed that PMCs were well accepted by the children and parents
Dean <i>et al.</i> , 2011 ^[10]	1207	GDPs	Scotland	Questionnaire	Higher numbers of GDPs were already using HTPMC
Gilchrist <i>et al.</i> , 2012 ^[14]	55	Final-year dental students	United Kingdom	Clinical data	HT had a marked impact on the treatment modality for carious primary molars
Page <i>et al.</i> , 2014 ^[15]	98	Parents of children treated with SSCs	New Zealand	Interview	Most of the children responded positively about HTPMC
Santamaria <i>et al.</i> , 2015 ^[16]	169 children	Children and dentists	Germany	Randomized control clinical trial	HTPMC is very easy to perform for 77% of dentists compare to the conventional method and dentists reported negative behavior of children to conventional than HTPMC
John <i>et al.</i> , 2016 ^[17]	66	Pediatric dentists and general practitioners	India	Questionnaire	85% of Pediatric dentists and GDPs preferred to use conventional methods rather than HTPMC
Roberts <i>et al.</i> , 2018 ^[11]	94	Pediatric dentists	United Kingdom	Questionnaire	HTPMCs widely used in UK.
Santamaria <i>et al.</i> , 2018 ^[18]	267	GDP	Germany	Questionnaire	SSCs are considerably underutilized in dental practice in Germany

GDP = general dental practitioner, HTPMC = The Hall technique preformed metal crown, PMC = preformed metal crown, SSC = stainless-steel crown

conventional restoration. An additional advantage of HT is the potential usefulness in areas with limited access to dental care. Because HT does not require any electrically driven equipment, it could be used in underdeveloped areas where neither electricity nor running water is available.^[20] Some concern remains regarding the influence of HT on the occlusal vertical dimension (OVD) as it does not involve any occlusal reduction of the tooth it is inevitable that placing a crown will result in a premature contact and increase in the OVD. It has been suggested that OVD would result in an equilibrium after a few weeks. It can be concluded that the patient with HT has to cope with premature contact for a few weeks.^[20] The effectiveness, acceptability, success rate, advantage, and disadvantage of HT can be better explained by a pedodontist rather than a GDP. There were some GDPs who refused to use HT because of the technical difficulty and aesthetic concern.^[17] On the contrary, this study

showed that placing a preformed metal crown in decayed primary molar is difficult to achieve. However, special training needs to perform this technique.^[16] In another study, they revealed that HT was chosen as an option more often for anxious children rather than the children who are not anxious.^[9]

The study result showed that most of the study was conducted in European countries. The result of these studies is not sufficient to determine the acceptability of HT all over the world. As we know the oral health and the behavior of the children among the different parts of the world are not same and there may be different types of the perceived barrier using HT. In a recent study conducted in Germany (2015), 66% of pedodontists did not use HT because of the technique complexity and aesthetic concern.^[16] Gilchrist *et al.*^[14] conducted a study on final-year undergraduate students of 2005, 2009, and 2010. The result of the study showed that placement of HT was

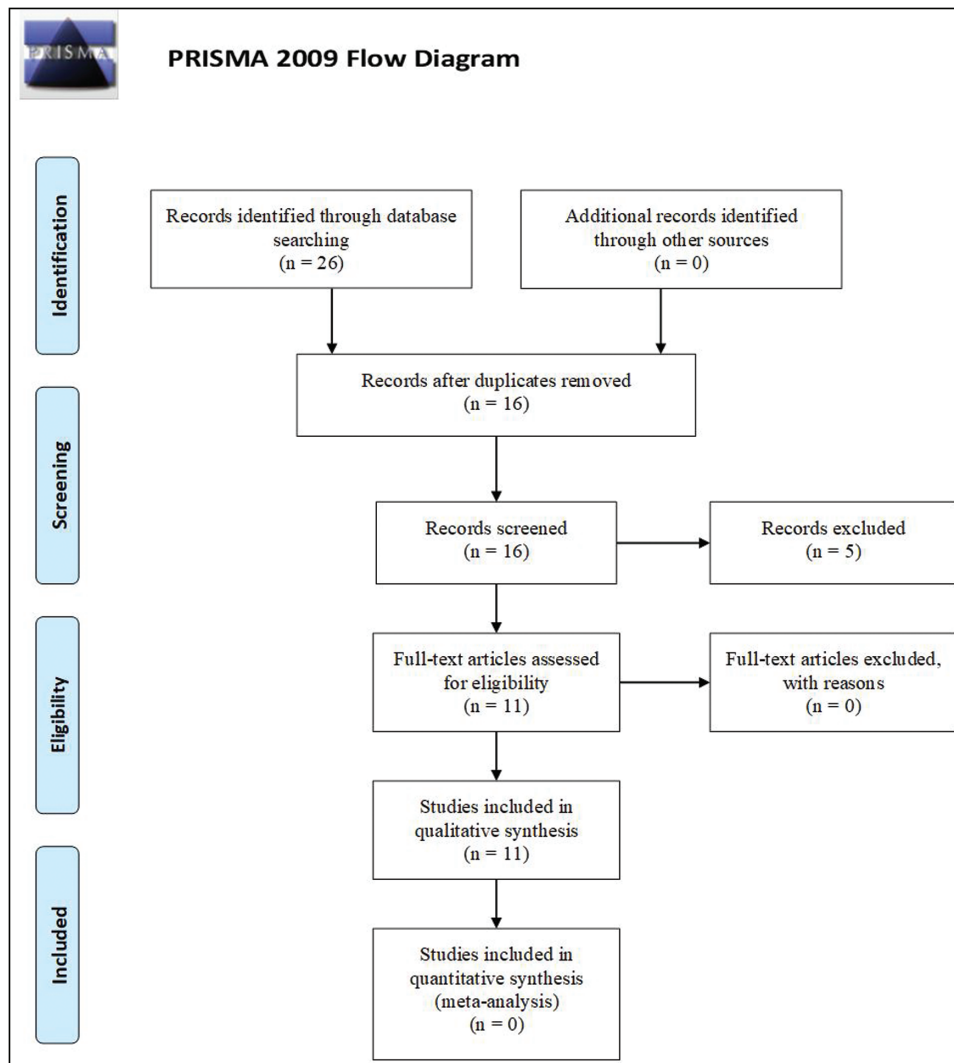


Figure 1: The number of studies found by searching through different databases and the selection procedure is detailed in the flow diagram according to PRISMA 2009 guidelines

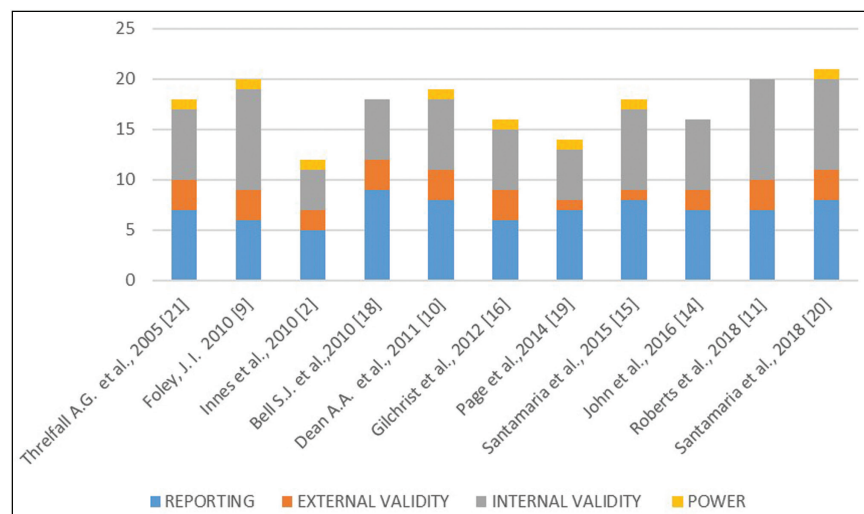


Figure 2: Pivot chart for risk of bias assessment

significantly higher in 2010 (75%), but they mentioned about the perceived barrier during performing HT, such as lack of clinical support, an anticipated increase in time, and financial pressure, and the ease of the use of glass-ionomer cement as an alternative.^[14] John *et al.*^[20] conducted a study that aimed to know the preference of treatment options to manage carious primary molars by the GDPs and pedodontists. The study was conducted by a questionnaire consisting of six questions among 60 participants from Chennai, Tamil Nadu, India. Approximately 85% of both GDPs and pedodontists preferred to use conventional methods as compared to other methods for managing carious primary molar. On the contrary, this study showed that placing a preformed metal crown in decayed primary molar is difficult to achieve. However, special training needs to perform this technique.^[17]

Among all the selected studies, there were four questionnaire-based studies and only Roberts *et al.*^[11] used 21 multiple-choice questions with free space for comments and they conducted the pilot study for making the questionnaire more validated. Reviewing all questionnaires, we found that this questionnaire was relevant to the study, but the questionnaire was mostly about the usage of HT; they did not give any information regarding children with special needs as well as parent's acceptability regarding the treatment cost. Malaysian Ministry of Health is promoting oral health-care services for children with special needs.^[21] Another questionnaire-based study conducted in Scotland revealed that 48% of respondents were using HT, and those who were not using HT preferred further training.^[10]

We found two studies where the respondents were children and their parents. The outcome of the study revealed that most of the parents and their children (90%) were satisfied with HT in comparison to conventional restoration. Three parents commented on the Hall's crown being an effective alternative to the restoration that keeps on falling.^[13] In another study, results showed that 90% of the children responded positively about their visits, which was asked immediately after having the Hall's treatment in dentists clinic, where the study was aimed to investigate the acceptability of HT by the children.^[15] There is one study that was conducted on children and dentists where the aim of the study was to compare the children's behavior and pain perception and the acceptability of HT. The study result showed that children showed less negative behavior in HT group (13%) as compared to conventional restoration (CR) group (37%) and the dentists reported positive behavior in HT group in comparison with the non-restorative caries treatment.^[16]

The main limitation of this review is that meta-analysis was unable to perform due to lack of the homogeneity of study results and only 11 full-text articles could be analyzed.

CONCLUSION

Most of the reviewed papers are questionnaire-based study; there should be more clinical trial-based studies along with the questionnaire to get an accurate outcome. A large prospective, randomized controlled clinical trial is needed to compare the different techniques with HT to determine the result whether they significantly different rates of restoration success. Moreover, there can be possibilities of biased results in the questionnaire-based study. The structure of the questionnaire could be developed such as more detailed information regarding children with special needs as well as parents' acceptability and treatment cost. In the selected studies, there was not any information regarding HT for the children with special needs. The study on the acceptability of HT could be conducted on other populations rather than Europe to evaluate the use rate of HT and its acceptability toward another region such as Asian countries or African countries. This study result can also motivate the pedodontists, GDPs, the postgraduate students, and the undergraduate students to practice HT regularly for managing decayed primary molars.

Financial support and sponsorship

This study was supported by Graduate Assistant Scheme, Universiti Sains Malaysia (2018–2019).

Conflicts of interest

There are no conflicts of interest.

REFERENCES

- Engel R. Chrome steel as used in children's dentistry. *Chron Omaha Dist Dent Soc* 1950;13:255-8.
- Innes NP, Evans DJ, Bonifacio CC, Geneser M, Hesse D, Heimer M, *et al.* The hall technique 10 years on: Questions and answers. *Br Dent J* 2017;222:478-83.
- Fejerskov O, Kidd E. *Dental Caries: The Disease and Its Clinical Management*. London, UK: Blackwell Publishing Ltd.; 2009:3–7.
- Schwendicke F, Frencken JE, Bjørndal L, Maltz M, Manton DJ, Ricketts D, *et al.* Managing carious lesions: Consensus recommendations on carious tissue removal. *Adv Dent Res* 2016;28:58-67.
- Ricketts D, Lamont T, Innes N, Kidd E, Clarkson JE. Operative caries management in adults and children. *Cochrane Database Syst Rev* 2013;3:CD003808.
- Berniyanti T, Bramantoro T, Palupi R, Wening GRS, Kusumo AD. Epidemiological investigation of caries level in 2nd and 3rd grader primary school student. *J Int Oral Health* 2019;11:44-7.
- Ludwig KH, Fontana M, Vinson LA, Platt JA, Dean JA. The success of stainless steel crowns placed with the hall technique: A retrospective study. *J Am Dent Assoc* 2014;145:1248-53.
- Innes N, Evans D, Hall N. The hall technique for managing carious primary molars. *Dent Update* 2009;36:472-4, 477-8.
- Foley J. A pan-European comparison of the management of carious primary molar teeth by postgraduates in paediatric dentistry. *Eur Arch Paediatr Dent* 2012;13:41-6.
- Dean A, Bark J, Sherriff A, Macpherson L, Cairns A. Use of the "Hall technique" for management of carious primary molars among Scottish general dental practitioners. *Eur Arch Paediatr Dent* 2011;12:159-62.

11. Roberts A, McKay A, Albadri S. The use of hall technique preformed metal crowns by specialist paediatric dentists in the UK. *Br Dent J* 2018;224:48-52.
12. Threlfall AG, Pilkington L, Milsom KM, Blinkhorn AS, Tickle M. General dental practitioners' views on the use of stainless steel crowns to restore primary molars. *Br Dent J* 2005;199:453-5; discussion 441.
13. Bell SJ, Morgan AG, Marshman Z, Rodd HD. Child and parental acceptance of preformed metal crowns. *Eur Arch Paediatr Dent* 2010;11:218-24.
14. Gilchrist F, Morgan A, Farman M, Rodd H. Impact of the Hall Technique for preformed metal crown placement on undergraduate paediatric dentistry experience. *Eur J Dent Educ* 2013;17:e10-5.
15. Page LA, Boyd DH, Davidson SE, McKay SK, Thomson WM, Innes NP. Acceptability of the hall technique to parents and children. *N Z Dent J* 2014;110:12-7.
16. Santamaria RM, Innes NP, Machiulskiene V, Evans DJ, Alkilzy M, Splieth CH. Acceptability of different caries management methods for primary molars in a RCT. *Int J Paediatr Dent* 2015;25:9-17.
17. John DA. The comparative study of the treatment for carious primary molars—A survey among general dentists and pedodontists. *J Pharm Sci Res* 2016;8:1324-6.
18. Santamaria RM, Pawlowitz L, Schmoeckel J, Alkilzy M, Splieth CH. Use of stainless steel crowns to restore primary molars in Germany: Questionnaire-based cross-sectional analysis. *Int J Paediatr Dent* 2018;28:587-94.
19. Downs SH, Black N. The feasibility of creating a checklist for the assessment of the methodological quality both of randomised and non-randomised studies of health care interventions. *J Epidemiol Community Health* 1998;52:377-84.
20. van der Zee V, van Amerongen W. Influence of preformed metal crowns (Hall Technique) on the occlusal vertical dimension in the primary dentition. *Eur Arch Paediatr Dent* 2010;11:225-7.
21. Ahmad MS, Shafie NE, Redhuan TM, Mokhtar IW. Referral pattern and treatment needs of patients managed at a Malaysian special care dentistry clinic. *J Int Oral Health* 2019;11:299-303.