

Significance of manual dexterity tests in Dentistry: A Review

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ABSTRACT

Manual Dexterity is interpreted as the ability to synchronise muscle movement and vision. Dexterity comprises of components such as control of force, precision grip, power grip, grasp and lift tasks. Development of these skills occurs over time, primarily during childhood. Manual dexterity development follows a set of developmental milestones, beginning with gross motor body movements progressing to fine motor body movements. As dexterity of high character not only benefits the Dentist but also supplements in delivery of high quality dental treatment adding to satisfactory patient experience.

Keywords: Dentistry, Dentist, Hand strength, Emotional Intelligence, muscles.

Introduction

Dentistry is a multifaceted profession comprising of knowledge in medicine and science, competence in art, dexterity and soft skills with personal qualities and social intelligence.¹The acquisition of psychomotor skills is but not limited to one of the important components of successful dentist.²

Manual Dexterity is interpreted as the ability to synchronise muscle movement and vision. This skill is unique to every individual.³ Dexterity is a skill in performing tasks, especially with the hands as given by the Oxford Dictionary. According to Cambridge dictionary; someone's ability to use hands to perform a difficult actions carefully and quickly so that it looks easy is appropriate definition of manual dexterity. Manual dexterity includes muscular, skeletal and neurological functions to produce, small precise movements.⁴

Dexterity comprises of components such as control of force, precision grip, power grip, grasp and lift tasks.⁵ Development of these skills occurs over time, primarily during childhood. Manual dexterity development follows a set of developmental milestones, beginning with gross motor body movements progressing to fine motor body movements.⁴ Typical manual dexterity development results in the ability to write with a pencil, stack blocks, pick up small items, cut with scissors and other skills requiring precise movements.⁴ The profession of dentistry requires knowledge and manual skills and competence,³ It's a profession which combines conventional art and science. And for this reason manual dexterity in a dentist should be of comparatively high standard. Dentists must be proficient in working with dental instruments as every dental procedure requires manual stability, bimanual co-ordination, hand-eye co-ordination and precision for all these are sub components of manual dexterity. Dexterity is therefore of colossal significance in dentistry.³

Application

The professional training of dental students involves the inculcation of comprehensible and practical skills to make them competent dentists and to preclude any professional adversities.³ For this, students undergo simultaneous theoretical and comprehensive practical training. In this context manual dexterity stands as a prime element in transition from theory to clinical practice.^{3,7,8}

Gross and fine motor expertise, spatial deafness are few competences developed in preclinical training laboratories. As this happens in initial phases, some students lack sufficient experience and face professional perplexities.³ Such students may face dexterity difficulties like carpal tunnel syndrome, manual stiffness, pain, shivering and incompetent hand-eye co-ordination, all of which may hinder the result of dental treatment.⁴ To perform dental procedures, a dentist should demonstrate substantial precision skills on an extremely

small scale. Hence the testing individuals to determine the extent of manual dexterity before preclinical training is beneficial.³ With these tests specific dexterity difficulties can be evaluated and respective approaches can be implemented to enable students to make the most of their preclinical training.

Dexterity tests

Dexterity tests such as the Perdue pegboard test, the Box and Block test, O'Connor finger dexterity tests and Functional Dexterity tests are popularly used for screening in dental students.^{6,10} Each test is peculiar and used for specific purposes.⁶

Manual dexterity is remarkably significant in dentists.^{3,9-10} There are two different approaches in which manual dexterity tests can be implemented. Some studies recommend dexterity tests as a part of dental education admissions test.¹¹ The aim of which is to anticipate the individuals skilfulness in practical training. One such implementation is the American Dental Association's The Dental Admission Test (DAT).¹² The DAT contains a section that particularly tests manual dexterity. Also The Sao Paulo State University implemented the Dental Manual Dexterity Assessment (DMDA) in their undergraduate dental students in their School of dentistry. In DMDA tests; based on statistical analysis the level of manual dexterity and the prevalence of level of manual dexterity and time required to were estimated using point estimation.¹⁰ Another approach recommends to perform dexterity assessment as additional aid in pre-clinical dental courses.^{3,10}

As mentioned earlier that dexterity consists of components and sub components. There are distinct tests each for a peculiar purpose. They are used to reckon both gross and fine motor skills.

Conclusion

Based on facts and documented studies and verificatory experiments; manual dexterity is indeed a poignant, noteworthy factor in Dentistry. As dexterity of high character not only benefits the Dentist but also supplements in delivery of high quality dental treatment adding to satisfactory patient experience. Hence it is recommended to the Dental Council of India, to implement the use of dexterity test according to their application in Dental education, either at admissions level or preclinical level.

Table 1. Tests that can be used in to measure manual dexterity in dental admissions test

Sr no	Tests	Application
1	Hamburg assessment test for medicine (HAM – Man) ¹³	Assessment of fine motor abilities
2	Finger dexterity, tweezer dexterity with aptitude test ¹⁴	Combination of aptitude and dexterity test to ascertain eligibility for dentistry
3	Manual dexterity test ¹⁵	To identify individuals who will experience difficulty in preclinical training
4	Pins and collar test ¹⁶	To anticipate which dental students will be ineligible

Table 2. Tests that can be used to assess manual dexterity in preclinical dental students

Sr no	Tests	Application
1	Fine motor skill test (Tremometer test) ¹⁷	Development of motor skills over the course of preclinical training
2	The box and block test ¹⁸	Training designed to improve manual dexterity
3	O'Connor tweezer dexterity test ¹¹	Analyse preclinical performance in restorative dentistry, fixed prosthesis, endodontics.
4	The Purdue Pegboard test ¹⁹	Analysing motor co-ordination of both gross and fine motor skills

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