Research Article

Awareness of serological markers among dental surgeons

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ABSTRACT

Background: Serological tests can be used for screening and confirmation of disease, exclusion of disease, and evaluation of prognosis. Knowledge of serological markers and their interpretation is important among dental surgeons to come to a more conclusive diagnosis. This survey was carried out to evaluate the awareness of various serological tests and its importance among dental surgeons. **Materials and Methods:** This cross-sectional study was conducted among the 110 dental surgeons from October 2019 to January 2020. A self-administered questionnaire containing 12 questions was made and circulated. Frequency analysis and percentage analysis were done with the obtained results. **Results:** About 83.7% of dentists were aware of the various types of serological markers available for diagnosis. About 47.7% have prescribed serological markers for various diseases. Only 37.2% of the dental surgeons were aware that alkaline phosphatase is used for analyzing both hepatobiliary and bone diseases. Awareness about gamma-glutamyl transferase as a hepatobiliary function test was present only among 48.8% of the participants. **Conclusion:** Knowledge and awareness of various serological markers is important among the dental professionals. This helps the dentists to diagnose patients with systemic illness and to take necessary precautionary steps during dental treatment.

KEY WORDS: Alkaline phosphatase, Dental professionals, Hepatitis B, Serological markers, Troponin

INTRODUCTION

Serology is classically defined as the study of proteins, predominantly antibodies, found in blood and secretions such as saliva.[1] Serological tests can be used for screening, confirmation of disease, exclusion of disease, determine the activity of diseases, control of therapy, assessment of epidemiology, and evaluation of prognosis. Serology assesses the presence of antigens or antibody response to the antigens produced by the body.[2] This immunoglobulin analysis can be based on the phenotype of an antibody subpopulation (e.g., ELISA) or decipherment (e.g., LC–MS/MS immunoglobulin sequencing).[1] Antibody serology is used in the diagnosis of hundreds of infectious, allergic, and autoimmune diseases, and new biomarkers and tests continue to expand the utility of serology.[3]

Exploratory tests and security tests are different types of serological screening tests.[2] In exploratory tests, a spectrum of tests is used based on the clinical and epidemiological situation to narrow down the further diagnostic procedures. Security tests are done to not miss a possible treatment or preventive measures. As screening tests lack high specificity, it is mandatory to confirm a positive screening result with a more specific test which is called as confirmatory tests.[4] Both the clinician and the laboratory staff should realize that a particular test result can have very different meanings depending on the question asked by the clinician and on the clinical situation.

Serological tests have a long history and have been used successfully for the rapid diagnosis of many infectious diseases (e.g., HIV, syphilis, and viral hepatitis).[5] The previous studies have evaluated serological markers for hepatitis B, hepatitis C, importance of alkaline phosphatase, and gamma-glutamyl transferase in liver diseases.[6,7] Lack of knowledge in interpretation of these serological markers can contribute to inadequate level of screening and referral of the patients.

Infectious diseases, autoimmune diseases, allergies, and malignancies are common in oral and maxillofacial

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region. Knowledge of serological markers and their interpretations is important for dental surgeons to come to a more conclusive diagnosis. This survey was carried out to evaluate the awareness of various serological tests and its importance among dental surgeons.

MATERIALS AND METHODS

This cross-sectional study was conducted among the 110 dental surgeons from October 2019 to January 2020. General dentists postgraduate students and specialists were included in the study. Undergraduate students were excluded from the study. The participation of the subjects was kept voluntary and was not obliged to fill the form. To evaluate the awareness of various serological markers among the participants, a self-administered questionnaire containing 12 questions was made and validated. The questionnaire had both open-ended and closed-ended questions. A web-based questionnaire was developed using Google Forms and was circulated. A total of 110 responses were obtained. Questions were answered with "yes" or "no" or by marking the correct responses. Frequency analysis and percentage analysis were done with the obtained results.

RESULTS

The overall response and percent analysis were calculated for each question in the survey. About 30.2% of the responses came from general dentists, 46.5% were postgraduates, and 23.3% responses were from specialists. About 83.7% of dentists were aware of the various types of serological markers available for diagnosis [Figure 1].

On evaluating the knowledge about various serological markers among the participants, only 37.2% of the dental surgeons were aware that alkaline phosphatase is used for analyzing both hepatobiliary and bone diseases. About 14% mentioned that alkaline phosphatase is used as a marker for hepatobiliary disease and 33.7% stated that it is a bone marker. About 68.6% of the dentists were aware of the serological markers used for the diagnosis of hepatitis B. Only 73.3% reported that blood urea nitrogen (BUN) is used as a marker for kidney function test. Awareness about gamma-glutamyl transferase as a hepatobiliary function test was present only among 48.8% of the participants. About 68.9% of the dental surgeons stated that troponin T/I can be used as a serological marker for myocardial infarction.

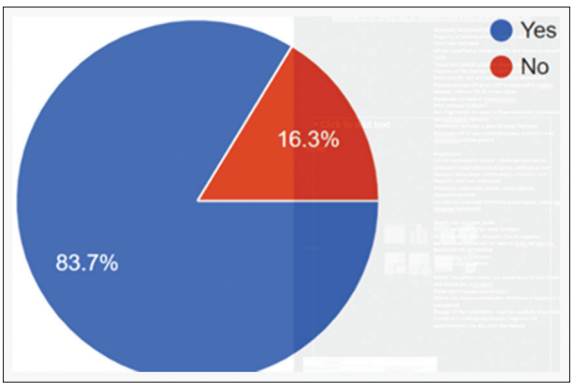

Figure 1: Pie chart that shows knowledge of serological markers among the dental professionals

When the use of serological markers in everyday practice was put in scrutiny, it was found that 55.8% of dental surgeons have consulted patients requiring serological tests. About 8.1% consulted one patient per year, 11.6% consulted two per year, and more than 2 by 36.2%. Only 47.7% have prescribed serological markers for various diseases. About 12.8% of dental surgeons have prescribed the serological markers once, 1% twice, and more than twice by 25.6% [Table 1].

DISCUSSION

Serological tests can be used for screening and confirmation of disease, exclusion of disease, and evaluation of prognosis. Dental surgeons should be aware of the interpretation of serological laboratory results, particularly when borderline results are obtained. This questionnaire study evaluated the knowledge of various serological markers among the dental professionals.

Knowledge about the serological markers is important for diagnosis of diseases, taking necessary precautions, and relating the diseases to oral health. Only 83.7% were aware of various serological markers used for diagnosis. This shows lack of knowledge among the dental professionals.

The oral cavity can reflect liver dysfunction in various forms such as jaundice, bleeding disorders, petechiae, increased vulnerability to bruising, gingivitis, and gingival bleeding.[8] It is important for the dental professionals to know about the serological markers used for various liver diseases. Hepatitis B virus infection is a major health problem worldwide due to its high prevalence and significant morbidity and mortality.[9] Health care workers are at increased risk of acquiring hepatitis B infection which is 2–4 times more than the general population.[10] Only 68.6% of the participants were aware of various serological markers used for hepatitis B. There are numerous serological markers available for diagnosis of hepatitis B. Serum HBs Ag is increased in case of primary and secondary infections. Past or resolved infection and previous vaccinated patients will be anti-HBs positive. Anti-HBc will help to assess acute, past, and chronic infection of hepatitis B.[11] This viral infection can be transmitted with contaminated needles or through

Table 1: Responses obtained from the participants

Questions	Option	Percentage
Response	Undergraduate – general dentist	15.1
	Postgraduate	15.1
	Specialist	46.5
		23.3
Consult patients requiring serological tests		55.8
Number of patients in an year	One	8.1
	Two	11.6
	More than 2	36.2
	Never encountered	33.7
Awareness of serological markers		83.7
Prescribed serological markers		47.7
Frequency	Once	12.8
	Twice	1
	More than twice	25.6
	Never prescribed	55.8
Knowledge about the serological markers used for the diagnosis of hepatitis B		68.6
Alanine aminotransferase (ALT)	Liver function test	75.6
Alkaline phosphatase (ALP)	Hepatobiliary disease	14
	Bone diseases	33.7
	Both the above	37.2
Blood urea nitrogen	Kidney function test	73.3
Gamma-glutamyl transferase is used to asses	Hepatobiliary function test	48.8
Troponin T/I is used as a marker for	Myocardial infarction	68.9

accidental inoculation of minute quantities of blood during dental procedures so it is important to take proper precautions by any health care worker before treating these patients.

Alkaline phosphatase is released by liver and bone; hence, it is a very important serological marker in liver and bone diseases.[12] This survey showed that only 37.2% of the participants were aware that alkaline phosphatase can be used as a marker for liver and bone disease. Highest amount of serum ALP is observed in Paget's disease. Moderate increase in osteomalacia, mild increase in rickets, very high levels in bone metastatic carcinoma, and osteogenic sarcoma.[6] Increased alkaline phosphatase level is also observed patients with liver congestion, intrahepatic biliary obstruction, and hepatic dysfunction.[13]

Gamma-glutamyl transferase (GGT) is another routinely used liver serological marker and is mainly released from the membrane of hepatocytes.[14] Its use has been well-established in liver dysfunction, bile duct conditions, and alcohol consumption.[7] Only 48.8% of the dental surgeons were aware of GGT as a serological marker for liver dysfunction. GGT can be used when a patient is suspected with liver metastasis.[15] The risk of bleeding in patients with serious liver disease and alterations in the metabolism of certain drug substances should be taken into consideration when treating these patients.[16]

Chronic kidney disease (CKD) like many other systemic diseases has associated oral manifestations. The salivary glands, periodontium, teeth, alveolar bone, and oral mucosa can all be affected, leading to gingival bleeding, early tooth loss, periodontitis, xerostomia[17] abnormal lip pigmentation, halitosis, and candidiasis. BUN is a screening test used for renal function. Urea is a nitrogenous end product of protein metabolism.[18] It is the primary metabolite derived from dietary protein and tissue protein turnover. The normal range of urea nitrogen in blood or serum is 5–20 mg/dl or 1.8–7.1 mmol urea per liter. This wide range is because of normal variations due to difference in protein intake, endogenous protein catabolism, state of hydration, hepatic urea synthesis, and renal urea excretion.[18] About 73.3% of the participants were aware that BUN can be used as a serological marker in screening renal function.[15] It is important to identify these patients as they may have associated oral lesions arising from the disease and will affect the treatment and prognostication.[19]

Cardiac troponin T is a myofibrillar protein which is expressed only in myocardial cells.[20] The cardiac troponins T and I (cTnT and cTnI) have been found to have excellent sensitivity and specificity in indicating myocardial necrosis.[21] Concentrations of both begin to rise in the 4–8 h following injury and peak at 12–24 h. cTnT may remain raised for more than 2 weeks and cTnI for more than 5–7 days.[21] About 68.9% of the dentists were aware that troponin T and I can be used as a marker for myocardial infarction. Cardiovascular disease trends, complications, and associated therapeutics impact the dental health and treatment.[22]

Such patients require special consideration with regard to when and which dental treatment is appropriate and what precautions are required. Cardiovascular drugs are also known to have mild to potentially fatal drug interactions.[22] Knowledge of the levels can prevent medical emergencies in practice. Strong association between Periodontal disease and risk of artherosclerosis, cardiovascular diasese and stroke are reported in literature.[23] These patients will be on antiplatelet and anticoagulant agents. Precautions should be taken for invasive procedures.

Alanine aminotransferase (ALT) is an enzyme involved in the alanine cycle and is primarily found in muscle and the liver.[24] This is also called as glutamate pyruvate transaminase and is an important enzyme in the intermediary metabolism of glucose and protein catalyzing the reversible transamination between alanine and 2-oxoglutarate to form pyruvate and glutamate.[25] In clinical practice, ALT is measured as one of the liver function tests to screen for hepatocellular injury.[26] Only 75.6% of the dental surgeons were aware that alanine aminotransferase can be used as a serological marker for screening liver diseases. Serum levels of ALT are commonly used to assess and monitor hepatic diseases. The reference values of serum ALT are 7–41 U/L. Serum ALT activity is significantly elevated in a variety of liver conditions, including viral infection, cirrhosis, non-alcoholic steatohepatitis (NASH), and drug toxicity.[25] Liver disorders are important to the dentist due to a potential bleeding tendency, intolerance to drugs, for example, general anesthetics, benzodiazepines, and the possibility of underlying infective causes for the liver dysfunction.[27]

Dental surgeons may encounter these patients in their daily practice. Only 55.8% of dental surgeons have consulted patients requiring serological tests. About 8.1% consulted one patient per year, 11.6% consulted two per year, and more than 2 by 36.2%. This could be because the patients may prefer a general physician rather than a dental surgeon for diagnosing and treating their systemic problems. About 47.7% have prescribed serological markers for various diseases. About 12.8% of dental surgeons have prescribed the serological markers once, 1% twice, and more than twice by 25.6%. This could be because of lack of knowledge about the serological markers and interpretation of results.

It is important to identify patients with possible risks of any systemic disease. Knowing the different normal laboratory values is an important in making a clinical decision. Different stages of various diseases will have an impact on the values of serological markers. There are various exceptions for the above tests, for example, ALT can be elevated in CKD also. It is very important to know all of these factors before taking a decision. Different combinations of serological markers can be used for diagnosing various diseases.

The compilation of a detailed clinical history and a thorough oral examination is essential before starting any dental procedure. The patient should receive a detailed explanation about the risks associated with the treatment and informed consent should be obtained. In consultation with the patient, physician or specialist is advisable to establish a safe and adequate treatment.

CONCLUSION

Knowledge and awareness of various serological markers is important among the dental professionals. The dentists play a very major role with other members of the health team in diagnosing patients with systemic illness, achieving optimal oral health, and by referring undiagnosed patients to physicians for further evaluation.

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