

## PATIENTS' AWARENESS AND PREFERENCE FOR BONE GRAFTS USED IN ORAL SURGERY

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### ABSTRACT

**Objective:** To identify the patients' preferences for a specific type or source of bone graft for the usage of bone grafts in dentistry Oral and Maxillofacial Surgery.

**Study Design:** Analytical cross sectional.

**Place and Duration of Study:** Oral and Maxillofacial Surgery department of Institute of Dentistry, Combined Military Hospital, Lahore Medical College, from May 2019 to Jun 2019.

**Methodology:** One hundred and fifty-two patients were selected by consecutive sampling from the oral surgery OPD clinic. A self-administered survey was used to investigate their preferences regarding bone graft materials. Results generated using SPSS-23 and descriptive statistics were calculated.

**Results:** The highest acceptance rate was for alloplastic grafts at 84 (55.3%) followed by autografts at 82 (53.9%). Bovine, allogenic and porcine grafts were not too well accepted at 45 (29.6%), 29 (19%) and 3 (2%) respectively.

**Conclusion:** Patients' preferences regarding bone grafts depends on many different factors and to provide informed consent, these factors must be discussed with the patients.

**Keywords:** Bone grafts/substitutes, Oral surgery, Patient preferences, Religious beliefs.

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### INTRODUCTION

Bone grafting has a long history, with the first ever bone graft being a xenograft done by Meekeren in the 17th century when he grafted a piece of a dog's parietal bone into the skull of a soldier. The success of this graft truly became apparent when the patient reported for removal of the graft as he was excommunicated by the Church for being part dog. At this point Meekeren realized that the graft had taken up well and would be difficult to remove. About 200 years later came a German surgeon, Von Walter who performed an autograft implant, replacing parts of the skull by bone trephination<sup>1</sup>. This was followed by the first ever successful allograft performed by Dr W Macewen in 1881. This was done in Scotland on a 3 year old child, replacing his infected humerus with sections of the tibial bone of another 10 year old child who was affected with anterior tibial curves. The surgery was done in multiple stages and the results were

very promising<sup>2</sup>. World War-II was monumental in the development of the field of Oral and Maxillofacial surgery providing much ground for experimentation and desperate surgical measures. With the continuing development of science and technology, alloplastics were introduced and work is still being done to produce new materials with better properties<sup>1</sup>.

Many procedures in oral surgery leave behind a bony deformity which requires the use of bone grafts. Such procedures range from dental extractions to cyst enucleation to tumor resections, to repair of acquired or congenital bone defect. Grafting options for patients include autografts, allografts, xenografts and alloplastic grafts<sup>3</sup>.

Autologous bone grafts are taken from the patients' own body and have osteoinduction, osteoconduction and osteogenesis inducing properties, which make it the 'gold standard' or ideal for bone regeneration. However, autologous bone grafts come with a price, they not only require a second surgery for bone harvesting but also show increased post-operative morbidity

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and not only was the bone harvested limited but the size and shape of the graft cannot be altered to a large extent. Bone grafts which are obtained from the same species and used as grafts after processing are called Allografts. This type of graft is found in mostly freeze-dried form. Xenografts are bone grafts taken from another species that are processed and used as bone substitutes in humans. Lastly, alloplastic grafts are synthetic bone substitutes consisting of hydroxyapatite, calcium sulfate or tricalcium phosphate. One advantage common to all bone substitutes over autografts is the avoidance of donor site morbidity but a disadvantage is that these bone grafts do not provide viable cells for phase I osteogenesis<sup>3</sup>.

It is the basic right of the patient to have complete information about all these treatment options and have the authority to choose from these in accordance with their religious and ethical values. This is what embodies the concept of patient autonomy and informed consent. Informed consent is based on providing the patient with complete information regarding the procedure. This includes the cost as well any aspect of the procedure that may affect the patients' decision<sup>4</sup>.

Different types of bone grafts are rejected by patients on different grounds. Studies identify fear of pain and discomfort, fear of transmission of disease from donor, ethical and religious beliefs and not wanting to use animals for human gain as common reasons for rejection<sup>5-7</sup>.

The purpose of this study was to assess the awareness that patients have regarding bone grafts available and their preferred bone graft. This study can help us identify patients' preferences for a specific type or source of bone graft, which can in turn help us develop national guideline on the usage of bone grafts in dentistry and oral surgery.

## **METHODOLOGY**

This cross-sectional analytical study was carried out at Institute of Dentistry, CMH, Lahore Medical College from May 2019 to June 2019. It

was approved by the Ethics Review Board (case no.#397/ERC/CMHLMC). The study was carried out in the department of Oral and Maxillofacial Surgery of Institute of Dentistry, CMH LMC. A sample size of 152 was calculated by using Cochran sample size formula by supposing a prevalence value of 0.5, patients were selected by consecutive sampling. An interview-based questionnaire was conducted out after taking verbal consent from the patient.

Inclusion criteria for this study was a minimum age of 18 years and willingness to participate in the study. Subjects who had not previously undergone any surgical procedure involving bone grafting and/or bone augmentation in the head and neck region and had not received any consultation and were not scheduled to undergo any such procedure. Only subjects who consented to be in the study were included. Patients who had undergone any procedure involving bone grafting were excluded from the study.

The questionnaire consisted of two parts. The first part recorded the patients' demographic details such as: age, gender and education in years (this was later categorized into: no formal education, primary, middle and higher education).

The second part recorded data regarding any prior information they had about bone grafts, willingness to undergo bone grafting and acceptance / rejection for each type of bone graft. It consisted of nine close ended questions. Preference for bovine and porcine grafts was recorded separately.

Data acquired was entered into SPSS-23. Descriptive statistics were calculated for all variables and the Pearson's chi-square test was used to observe association between different variables and  $p$ -value  $<0.05$  was considered significant.

## **RESULTS**

The total sample size was 152, out of which 99 (65.1%) were females and 53 (34.9%) were males. The mean age of the patients was  $39.76 \pm$

12.9 with the minimum being age 18 years and maximum being 72 years. The education in years was converted to the following categories: no education, primary education, middle education and higher education. The results of which are displayed in figure.

A total of 106 (69.7%) of the subjects were willing to undergo a procedure to get a bone graft if advised by a dentist. There was a significant relationship between gender and willingness to accept a bone graft,  $p=0.009$ , with males being more willing to undergo a procedure to get a bone graft than females (table).

**DISCUSSION**

With the constant advancement in medicine and biomaterials, it is the duty of the clinician to be familiar with not only the properties and application of these materials but also with the patients’ values regarding perception of such things. It is now recommended to routinely use bone grafting not only for large defects left by curative surgeries but also for periodontal<sup>8</sup> as well implant surgery<sup>9,10</sup>. However, some of these materials may conflict with the patients’ views<sup>5-7,11</sup>.

Our study showed the acceptance of alloplastic grafts to be the highest at 55.3%

**Table: Relationship of gender and willingness of subjects for acceptance of bone graft.**

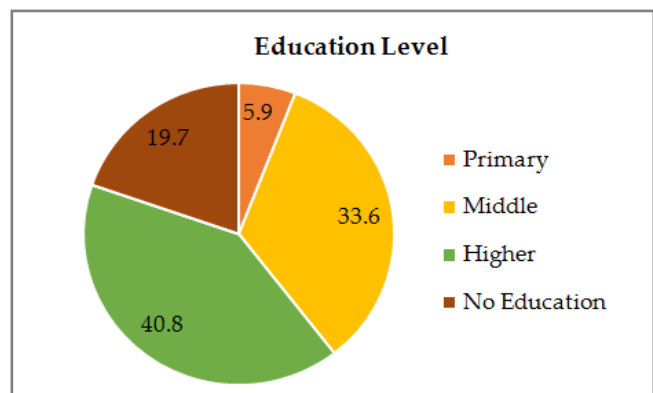
Gender	Willingness		Knowledge		Interest		Autografts		Allografts		Bovine		Porcine		Alloplastic	
	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Male	9 (17%)	44 (83%)	50 (94.3%)	3 (5.7%)	5 (9.4%)	48 (90.6%)	23 (43.4%)	30 (56.6%)	40 (75.5%)	13 (24.5%)	33 (62.3%)	20 (37.7%)	52 (98.1%)	1 (1.9%)	17 (32.1%)	36 (67.9%)
Female	62 (62.6%)	37 (37.7%)	88 (88.9%)	11 (9.1%)	20 (20.2%)	79 (79.8%)	47 (47.5%)	52 (52.5%)	83 (83.8%)	16 (16.2%)	74 (74.1%)	25 (25.3%)	97 (98%)	2 (2%)	51 (51.5%)	48 (48.5%)
<i>p</i> -value	0.01		0.27		0.09		0.63		0.21		0.11		0.96		0.22	

n=152, a *p*-value of less than 0.05 was considered significant. Values have been rounded up to decimal palces.

Of the surveyed subjects, 14 (9.2%) of the subjects already had some knowledge about the bone grafts used in oral surgery and 127 (83.6%) were actually interested to know about the different bone grafting options available.

Synthetic bone grafts elicited the highest acceptance at 84 (55.3%) of the subjects opted for it but there was no significant relationship observed with education level or age of the patient. Autografts were observed to be the second most preferred type of bone grafts as 82 (53.9%) of the subjects agreed to use it. Bovine xenografts were accepted by 45 (29.6%) of the subjects whereas allograft and porcine were not too well accepted at 29 (19.1%) and 3 (2%) respectively. No significant relationship was found between any other variable (table).

followed by autografts (54%) which was in line



**Figure: Education level of subjects.**

with the research carried out by Bucchi *et al* in 2019 and Fernández *et al* in 2015 which showed acceptances rates of 93.7% and 98% for alloplastic grafts respectively<sup>6,7</sup>. Güngörmüş and Güngör-

müş in 2017 reported alloplastic grafts to have an acceptance rate of 65%, which is more comparable with our result but it was the second most accepted graft in their study second to autografts (acceptance rate of 88.7%)<sup>5</sup>. Offner *et al* conducted a large study in France and also reported that autografts had the highest acceptance rate at 93.4% followed by alloplastic grafts at 87.2%<sup>11</sup>. Almutairi had similar results and reported autografts to be the most accepted (89% intra-oral and 72% extra-oral) and alloplastic grafts had the second highest acceptance rate at 87%<sup>12</sup>.

Bucchi *et al* identified fear of pain and discomfort as the main reason for subjects to reject autologous bone grafts, making it an alternate option for patients rather than the gold standard. Güngörmüş and Güngörmüş observed that the major cause of rejection of allografts was that the patient considered them to be foreign bodies that may cause infection. Other reasons identified in studies include religious beliefs, ethical values and moral motivation<sup>5-7,11,12</sup>. The reason for alloplastic grafts being more accepted was the fear of pain associated with autografts. This implies that if patients are adequately counselled and educated regarding different types of grafts, some of their fears (such as those associated with pain and discomfort of donor site) can be eliminated and a decision which is acceptable by the patient and the operator can be made.

According to Bucchi *et al*, 40.5% of the patients rejected allografts and 32.7% rejected xenografts, whereas only 6.3% of the patients refused alloplastic grafts. This study was carried out on a sample in which only 10 Muslims participated and Bucchi concluded that Muslims were more prone to reject xenografts<sup>6</sup>. Fernández *et al* found no relationship between rejection of xenografts but this study was also carried out on a Christian community<sup>7</sup>. However, in a study carried out in Turkey by Güngörmüş and Güngörmüş, which is predominantly a Muslim country, the acceptance rate of porcine xenografts was 7.1%<sup>5</sup>. Almutairi reported the highest refusal rate for xenografts and linked this with religious reasons as the study was carried out in Saudia

Arabia which is a Muslim country<sup>12</sup>. Offner *et al* reported that only a small percent of the sample (1.2%) rejected xenografts based on religious reasons<sup>11</sup>. This shows how patient preference for type of bone graft may change according to their religious beliefs or ethical values.

In the current study, porcine xenografts had the lowest acceptance rate at 2%. The same was observed in Turkey and Saudia Arabia. Pakistan is a Muslim country<sup>13</sup> and the according to the Muslim belief, consumption of porcine products is prohibited. Muslims can only gain benefit from porcine products if no other alternatives are available and it is a life-threatening situation. But porcine products are to be avoided as much as possible even if the alternative takes longer duration of recovery or is more expensive<sup>14,15</sup>. Beef and beef products are not prohibited in Islam as long as the animal is slaughtered according to the Islamic law. This explains the higher acceptance rate for Bovine grafts in the current study as well as in Turkey. Judaism has somewhat similar teachings regarding use of animal products as preservation of human life is a divine commandment. Even though pork and pork products are prohibited in Judaism they may be used for preservation of human life. In Hinduism, the cow is considered to be a cared animal and bovine grafts are prohibited in Hindu populations<sup>14-16</sup>.

The reason for rejection of xenografts in other studies was not majorly based on religion as Christianity was the predominant religion of the participants. Bucchi also observed that the Muslims were more prone to reject xenograft as compared to Christians. (Xenograft source was not specified in the study by Bucchi). Studies conducted by Bucchi and Fernandez *et al* both identify risk of infection from animals to be the leading cause of rejection of xenografts<sup>11,12</sup>.

Involving the patient in decision making regarding not only the procedure but the materials used is the basic right of the patient. Patient autonomy is an integral pillar of medical ethics and requires that the patient be given complete information to help them make a decision about a

treatment plan. This includes not only respecting the patients' religious and ethical values but also not coercing a patient into accepting a certain treatment plan just because operator prefers it<sup>4,16</sup>. While it is not the place of the operator to counsel the patient on religious beliefs or prohibitions, discussion regarding unfounded fears can help the patient as well the operator to establish a more trusting relationship which may contribute to better outcomes. Seeing how different religions have strict specific teachings regarding certain animal products it is imperative that the constituents or origin of biomaterials be discussed with the patient. In accordance with the Human Rights Act, article<sup>9</sup>, it is imperative to inform patients of the constituents of any biomaterials used in their treatment and failure to do so deprives the patient of their basic rights<sup>17</sup>. A proper informed consent helps patient acceptance and compliance to a certain treatment plan and in turn gives better outcomes<sup>12,18</sup>.

Shared decision making is a concept that allows the patient to be a part of their decision making process with regard to their own treatment plan. Dries *et al*, reported that about 79.8% of the patients wanted to be involved in the decision making process of accepting a liver from a donor. Whereas only 9.6% had no desire to be involved in this process<sup>19</sup>. In the current study 127 (83.55%) of the subjects wanted to know more about bone grafts. This further highlights the importance of including the patient in treatment planning.

None of the studies identified cost as a factor for rejection of any type of grafts. The author suggests that this factor should not be ignored while giving the patient treatment options. Seeing the higher acceptance rate of alloplastic grafts, it can be suggested that the demand for them will soon increase. Unfortunately, alloplastic grafts are not always the answer to surgical bony deformities and other type of bone grafts may need to be considered, increasing the cost of the procedure. A graft that fits the preference of the patient as well the need of the procedure may then be selected.

A few interesting results worthy of discussion include the fact that in our study, men were more likely to get bone grafts as compared to women which is opposite to as observed by Almutairi reported women as being more acceptable of bone grafts than men<sup>12</sup>. The other studies mentioned no significant relationship.

Pakistan is one of the low literacy rate countries of Asia with a literacy rate of 56.98%<sup>20</sup>. According to our study, 19.74% of the sample size had received no formal education whereas 40.79% of the patients came in the 'higher education' category. This can be explained by the fact that our study is based in Lahore which is a city of high literacy rate in comparison to other areas of Pakistan.

A generalization of these results is not applicable due to the cultural and religious diversity of the populations targeted. The author suggests that a larger study be conducted, in different areas of Pakistan to better assess patient preferences regarding sensitive issues such as bone graft surgeries. Having an idea of patients' views and beliefs will help the health care providers bridge the gap and provide better treatment options.

## CONCLUSION

Patients' views must be taken into account when designing treatment plans and their views regarding different biomaterials should be respected. Religious beliefs may play a huge role in patients' acceptance or refusal of a certain treatment plan.

## CONFLICT OF INTEREST

This study has no conflict of interest to be declared by any author.

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